

Appendix B
Alternatives Screening Report



Alternatives Screening Report

East Bay Municipal Utility District Supplemental Water Supply Project

Prepared for:



Prepared by:

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**Alternatives Screening Report for the
EBMUD Supplemental Water Supply Project**

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Chapter 1. Introduction

PURPOSE OF THE ALTERNATIVES SCREENING REPORT

The East Bay Municipal Utility District (EBMUD) is proposing the Supplemental Water Supply Project to supply municipal and industrial water users within its service area, as allowed for under EBMUD's American River water service contract with the U.S. Bureau of Reclamation (Reclamation).

The Supplemental Water Supply Project is intended to provide an additional source of water to assist EBMUD in ensuring a safe and reliable water supply for its customers in accordance with a set of defined project objectives (presented in Chapter 2). The Supplemental Water Supply Project would be implemented to assist EBMUD in reliably meeting current and projected customer demand. It would involve construction and operation of a water-conveyance system to deliver American River water to EBMUD's existing Mokelumne Aqueducts, which currently convey water from Pardee Reservoir on the Mokelumne River in the Sierra Nevada foothills to the EBMUD service area in Contra Costa and Alameda counties. Several alternative water supply projects, as well as alternative conveyance system alignments and delivery points, are considered as possible options for achieving the basic project purpose in this document. Water conservation, water reclamation, and conjunctive use are discussed in Chapter 2.

This alternatives screening report satisfies the following three purposes:

- identify a set of reasonable alternatives that will be included for evaluation in the project environmental impact report/environmental impact statement (EIR/EIS),

- document the process by which alternatives have undergone preliminary screening as part of the identification of practicable alternatives for the project, and
- serve as part of the environmental documentation for a pipeline connection between the Folsom South Canal (FSC) and the Mokelumne Aqueducts as called for in the Updated WSMP Action Plan.

Compliance with CEQA and NEPA

Before approving the Supplemental Water Supply Project, the EBMUD Board of Directors has determined that preparation of an EIR in accordance with the California Environmental Quality Act (CEQA) (Pub. Res. Code, Section 21000 et seq.) is required. The primary purpose of the EIR is to identify and publicly disclose any significant environmental impacts that may result from implementation of a project and to identify feasible alternatives, mitigation measures, or revisions to the project that would reduce those impacts.

Pursuant to Section 15126(d) of the State CEQA Guidelines, an EIR must describe and evaluate a range of reasonable alternatives that would feasibly attain most of the basic project objectives, but would avoid or substantially lessen any of the significant effects of the project as proposed. The guidelines state that the range of alternatives required to be evaluated in an EIR is governed by the "rule of reason": the EIR needs to describe and evaluate only those alternatives necessary to permit a reasoned choice and to foster informed decision making and public participation.

Similar to CEQA, the National Environmental Policy Act (NEPA) and the Council on Environmental Quality NEPA regulations (40 CFR 1500 et seq.) require federal agencies, when proposing to carry out, approve, or fund a project, to evaluate the

environmental effects of the action, including feasible alternatives and mitigation measures to minimize adverse impacts. Several federal agencies may need to take action on the Supplemental Water Supply Project, depending on the specific configuration of the project for which EBMUD eventually seeks approval. Because many of the alternatives under consideration would require an amendment of EBMUD's water service contract with Reclamation as an essential element, Reclamation will serve as lead federal agency under NEPA. Because of the complex nature of the Supplemental Water Supply Project, EBMUD and Reclamation have determined that preparation of an EIS is the most expedient form of NEPA compliance. In addition to Reclamation, other federal agencies that may rely on the EIS to provide NEPA compliance for their individual approvals include the U.S. Army Corps of Engineers (Corps) and the Surface Transportation Board.

Clean Water Act, Section 404 Requirements

To meet the basic project purpose, EBMUD may need to discharge dredged or fill materials into waters of the United States. The most likely activities associated with such discharges include construction of water conveyance pipelines that cross drainages, streams, and rivers and construction of new river intake facilities. Section 404 of the federal Clean Water Act is the statutory mechanism by which the Corps permits such discharges into waters of the United States.

Section 404(e) of the Clean Water Act authorizes the Corps to issue general permits on a state, regional, or nationwide basis. The general permits issued by the Corps on a national level are called nationwide permits. Nationwide permits, and other general permits, are designed to apply to categories of discharge activities that are similar in nature and will cause only minimal adverse environmental effects. The Corps recently issued new

guidance on nationwide permits, including revised conditions for existing nationwide permits and new categories of activities allowed under nationwide permits. Nationwide Permit 12, Utility Line Discharges, may be applicable to part or all of the Supplemental Water Supply Project, depending on the alternative ultimately selected by EBMUD. This nationwide permit establishes the conditions under which discharges of dredged or fill material will be permitted.

If the Corps determines that the Supplemental Water Supply Project does not meet the conditions of Nationwide Permit 12, or other nationwide permits, an individual permit may be required. Section 404(b)(1) guidelines promulgated by the U.S. Environmental Protection Agency (EPA) govern, in part, the issuance of individual permits by the Corps; compliance with Section 404(b)(1) guidelines is mandatory before issuance of an individual permit by the Corps. Subpart B of Section 404(b)(1) guidelines states:

No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences (40 CFR 230.10[a]).

An alternative is considered practicable if it is available and feasible after taking into consideration cost, existing technology, and logistics in light of the overall project purpose (40 CFR 230.10[a][1]).

Section 404(b)(1) guidelines qualify the requirements for discharges to special aquatic sites for uses that are not considered to be "water dependent" by the following regulatory presumption:

Where the activity associated with a discharge which is proposed for a special aquatic site (as defined in Subpart E) does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not "water dependent"), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise (40 CFR 230.10[a][3]).

The Supplemental Water Supply Project is not anticipated to represent a water-dependent activity as defined above.

In addition to identifying a set of reasonable alternatives for consideration in the CEQA/NEPA analysis, this alternatives screening report documents the process by which alternatives undergo preliminary screening as part of the identification of the least environmentally damaging practicable alternative for the project, in accordance with the Section 404(b)(1) guidelines, should compliance with these guidelines ultimately be required.

ORGANIZATION OF THIS REPORT

Following this introductory chapter, the remainder of this report is organized as follows:

- Chapter 2, "Purpose of and Need for the Project," describes EBMUD's current water supply, the Hodge Decision, the relationship of the proposed project to the Updated WSMP and Action Plan, and EBMUD's need for a supplemental water supply and its FSCC project objectives.
- Chapter 3, "Project Alternatives," describes each alternative under evaluation.
- Chapter 4, "Alternatives Screening Criteria," describes each screening criterion used for first-stage screening and presents supporting information used in development of first-stage criteria.
- Chapter 5, "Alternatives Evaluation," provides the results of the first-stage screening of alternatives.
- Chapter 6, "Citations," is a list of all information sources used in preparation of this report.

Chapter 2. Purpose of and Need for the Project

BACKGROUND

EBMUD is a multipurpose, regional agency that serves as water purveyor to an estimated 1.2 million municipal and industrial water users throughout portions of Contra Costa and Alameda counties in the East Bay region of the San Francisco Bay Area (Figure 2-1). During nondrought years, EBMUD supplies its customers with a total annual average of about 220 million gallons per day (MGD) of water. Approximately 95% of this supply is Mokelumne River water collected in Pardee Reservoir. The remaining estimated 5% of the supply is local runoff collected in terminal storage reservoirs owned and operated by EBMUD in the EBMUD service area. Both sources are described in the greater detail below.

The Updated WSMP EIR (EDAW 1993), the EBMUD Board of Directors CEQA Findings on the Updated WSMP (East Bay Municipal Utility District 1993a), and EBMUD's Urban Water Management Plan (East Bay Municipal Utility District 1996) are hereby incorporated by reference and are available for inspection at EBMUD's headquarters in Oakland, California. Relevant aspects of these documents are described below and throughout this report.

EBMUD's Mokelumne River Water Supply

EBMUD has water rights to divert a maximum of 325 MGD of water from the Mokelumne River for delivery to its service area. This water supply is impounded in Pardee Reservoir (197,950 acre-feet [AF]) from runoff collected from the Mokelumne River watershed, which encompasses 575 square miles of the western slope of the Sierra Nevada in Alpine, Amador, and Calaveras counties. From Pardee Reservoir, the water is diverted to the Mokelumne Aqueducts, which consist of three separate pipelines extending approximately 90

miles from Pardee Reservoir to the EBMUD service area. The system can operate under gravity flow at up to 200 MGD. Through operation of the Walnut Creek Pumping Plant, aqueduct capacity can be increased to 326 MGD.

EBMUD uses Camanche Reservoir (417,120 AF) downstream of Pardee Dam to impound Mokelumne River water and manage releases for regulation of downstream flows. EBMUD's ability to use its maximum Mokelumne River entitlement of 325 MGD is limited by river hydrology and a variety of downstream flow obligations, including releases for flood control, fishery needs, and senior water rights holders. EBMUD's position in the hierarchy of Mokelumne River water users is determined by a variety of agreements between Mokelumne River rights holders, as well as by the appropriate permits and licences issued by the California State Water Resources Control Board (SWRCB).

EBMUD Terminal Storage Reservoirs

As noted above, the Mokelumne Aqueducts deliver Mokelumne River water to Walnut Creek in EBMUD's service area. From Walnut Creek, the water is directed into three filter plants and/or to EBMUD's five terminal storage reservoirs (Figure 2-1). Capacities of the terminal reservoirs are provided in Table 2-1. Together, the terminal reservoirs have a usable capacity of approximately 138,000 AF.

Two of the terminal reservoirs, Upper San Leandro and San Pablo, convey water to three treatment plants that serve the northern and southern portions of the EBMUD distribution system west of the Oakland-Berkeley Hills. These two reservoirs and a third, Briones Reservoir, are used to store water before treatment and to reregulate the Mokelumne River supply to provide emergency supply and

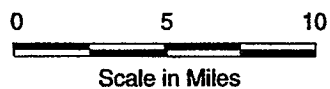
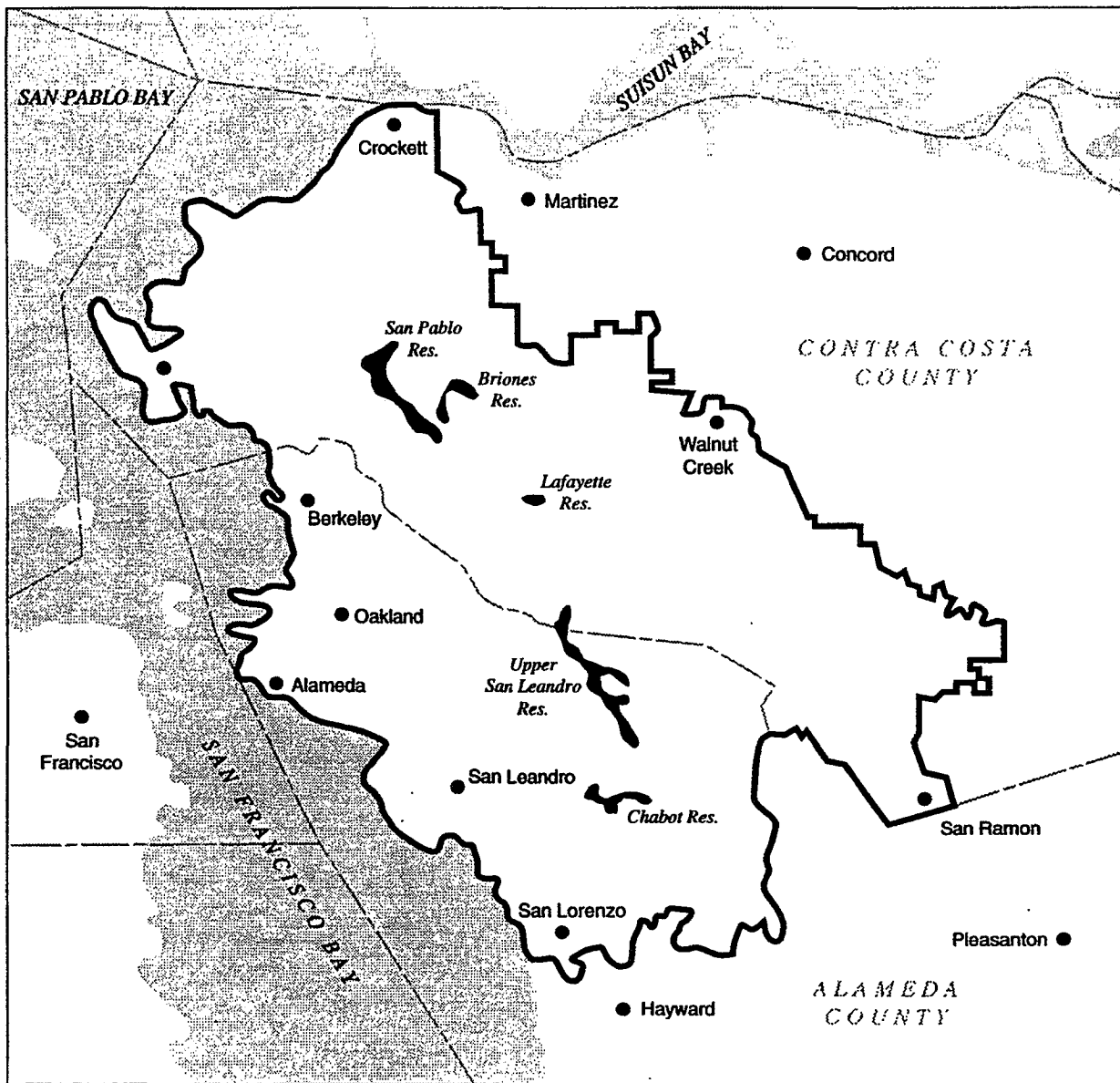
Table 2-1. EBMUD Terminal Reservoir and Dam Characteristics

Water Source		Capacity in Thousand Acre-Feet	Overflow Elevation (feet)	Construction Date
Briones	Mokelumne Aqueducts Bear Creek	60.5	576.1	1964
Chabot	Mokelumne Aqueducts San Leandro Creek Upper San Leandro Reservoir	10.4	227.3	1875
Lafayette	Mokelumne Aqueducts	4.3	449.2	1929
San Pablo	Mokelumne Aqueducts San Pablo Creek Bear Creek Briones Reservoir	38.6	313.7	1920 (Dam reinforced in 1979)
Upper San Leandro	Mokelumne Aqueducts San Leandro Creek and tributaries	41.5	460	1926 (New dam built immediately downstream in 1978)
Total existing capacity		155.3*		
Total usable capacity		137.8		
Notes: All dams are earthfill.				
* 17,500 AF of the total capacity is unusable.				

store local runoff. The remaining two reservoirs, Lafayette and Chabot, are not regularly used for water distribution but provide emergency standby supply and, along with San Pablo reservoir, are used extensively for recreation.

The intended functions of the terminal reservoirs are:

- Emergency Standby - A minimum of 120 days of supply at normal demand is maintained for use during supply disruptions or outages.
- Regulation - Mokelumne River water is stored in winter and spring, when Sierra runoff occurs and demand is low, for use during the high demand period in summer.
- Drought Reserve - Drought reserve is maintained for meeting supply shortages in dry periods such as occurred in 1928–1934, 1976–1977, and 1987–1992.
- Development of Local Yield - Storm runoff is collected and stored from the reservoir watersheds.
- Environmental Preservation and Recreation - The 26,000 acres of watershed land on which these reservoirs are located provide open space and water-related recreation. These lands and water constitute a valuable urban refuge permanently protected from development. These watershed lands and the adjacent regional parks include an 80-mile system of trails in the area east of the Oakland–Berkeley Hills.



Legend

— EBMUD Ultimate Water Service Area



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Figure 2-1
EBMUD Service Area

- Flood Protection - During the wet season, a portion of the terminal storage is reserved for temporary storage of storm runoff. This storage reduces the risk of flooding downstream of the reservoirs.

EBMUD facilities also include the Bixler Emergency Pumping Plant (Bixler), located in Werner Dredger Cut, Mile 2.9 (Indian Slough), approximately 5 miles east of Brentwood. Completed in 1989, Bixler's permits limit operations to emergency purposes when EBMUD's normal water supply is disrupted or inadequate to meet customer needs. The capacity of Bixler is 90 cubic feet per second (cfs). On February 22, 1989, the Corps issued a permit to operate Bixler with an expiration date of December 31, 1989. Bixler was never operated, and the permit expired. Subsequently, permits were renewed twice with the last renewal expiring on December 31, 1993. Presently, Bixler does not have a permit to operate.

Existing EBMUD-Reclamation Water Service Contract

In 1970, EBMUD entered into a water service contract with Reclamation to divert up to 150,000 AF of American River water annually from the FSC as a supplementary water supply. The FSC is a concrete-lined, open canal with a design capacity of 3,500 cfs of water. The canal originates on the American River at Nimbus Dam, which impounds Lake Natoma, and extends south approximately 26 miles, terminating west of the Rancho Seco nuclear power plant, which is owned by the Sacramento Municipal Utility District (SMUD) (Figure 2-2). A turnout constructed near Grant Line Road, approximately 12 miles south of the Nimbus Diversion Works (Nimbus), represents the water delivery point identified in the EBMUD-Reclamation water service contract. Water is not currently being delivered under this contract.

Besides EBMUD, only SMUD and Arden Cordova Water Service hold long-term water service contracts with Reclamation for delivery through the FSC. SMUD holds a contract for up to 60,000 AF per year, and the Arden Cordova Water Service has a right for up to 10,000 AF per year. SMUD also has the right to an additional 15,000 AF per year from an assignment of water from the City of Sacramento. The City of Sacramento holds a water rights settlement contract with Reclamation, which guarantees American River water to meet the City's needs.

The County and Sacramento County Water Agency currently have no long-term surface water entitlements but are pursuing surface water entitlements through separate efforts, including a new water service contract with Reclamation under Public Law 101-514, an assignment of a portion of SMUD's existing Reclamation water service contract, water transfers, and a new water right from the SWRCB (Sacramento County Application to Appropriate Water by Permit submitted to SWRCB on April 14, 1995).

The Hodge Decision

A lawsuit (*Environmental Defense Fund et al. v. East Bay Municipal Utility District*, Alameda County Case No. 425,955) filed in 1972 by the Environmental Defense Fund (EDF), and Save the American River Association and later joined into by Sacramento County, the California Department of Fish and Game (DFG), and the State Lands Commission as intervenors, sought to prevent EBMUD from taking delivery of American River water through the FSC as provided by the EBMUD-Reclamation contract. When the trial began in 1984, the court referred the case to the SWRCB. The plaintiffs argued that EBMUD's use of 150,000 AF annually would reduce downstream flows to the extent that instream public trust values of the lower American River would be jeopardized. Particular emphasis was placed on the need for maintenance of sufficient

instream flows to protect the fishery resources of the lower American River, portions of which serve as spawning grounds for several species of anadromous fish, including chinook salmon, steelhead, striped bass, and American shad. The importance of sufficient flows for recreational purposes was also considered.

On January 2, 1990, following 17 years of litigation, Alameda County Superior Court Judge Richard A. Hodge issued a decision, known as the Hodge Decision, which imposed a Physical Solution as a means of accommodating the diverse and conflicting interests that were addressed (Hodge Decision 1990). The ultimate objective was to provide for the fullest beneficial use of the water of the American River, and at the same time, to protect the sensitive public trust values of the lower American River (p. 108 in Hodge Decision 1990). Under the Hodge Decision, EBMUD may use its 1970 water service contract with Reclamation under the condition that it take delivery of American River water only when the river channel contains specific instream flow levels, which vary throughout the year. The required instream flow levels, determined by Judge Hodge to adequately protect resources on the lower American River, are:

- 2,000 cfs from October 15 through February;
- 3,000 cfs from March 1 through June; and
- 1,750 cfs from July 1 through October 14.

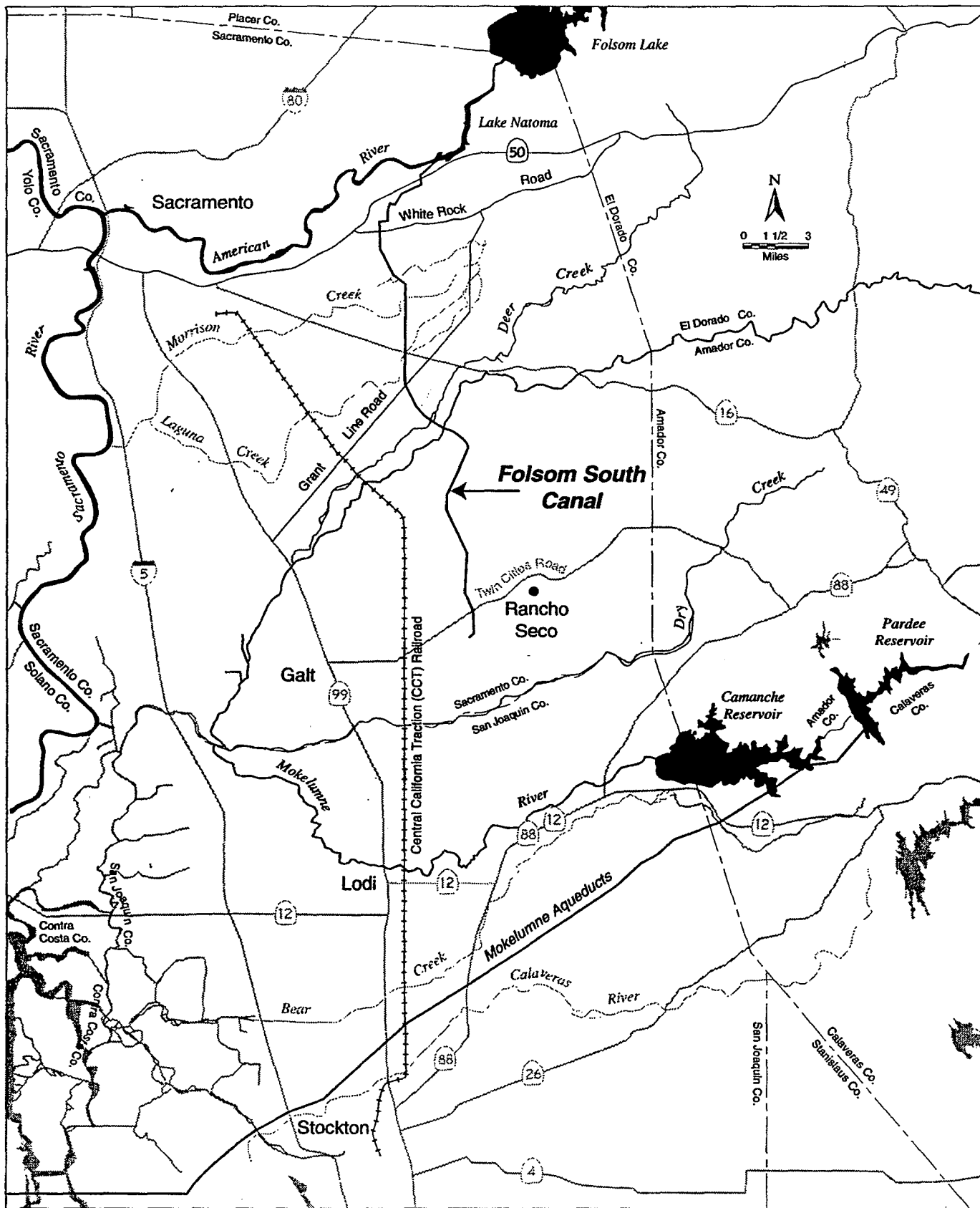
The Hodge Decision also encourages EBMUD to take delivery of as much of its allocated supply as possible when instream flows are least required for protection of environmental interests and public trust values. EBMUD must also limit use of its American River allocation to supplementing its municipal water supply in response to customer demand; the Hodge Decision does not currently allow EBMUD to sell any portion of its American River water supply to a third party.

Extensive testimony on water quality, fisheries, and other American River issues was received during *EDF et al. v. EBMUD*. Case testimony used in evaluating the potential project alternatives is cited as appropriate in this alternative screening report.

UPDATED WATER SUPPLY MANAGEMENT PROGRAM

EBMUD's existing developed water supplies are insufficient to meet customer needs in droughts despite implementation of water conservation and reclamation programs. Even the 25% cutbacks in the 1987–1992 drought could not stretch water supplies to meet customer use. Without near-term additional water supplies, EBMUD customers will experience more frequent and severe water supply shortages. Rationing of up to 68% would be necessary in the future without additional water supplies, resulting in severe regional economic and quality-of-life impacts.

The combined storage capacity of Pardee and Camanche reservoirs is vital to EBMUD's ability to meet its downstream obligations for releases for fisheries and senior water rights and to ensure reliable service to its customers and sufficient flows for instream uses during dry years. In wet years, any portion of EBMUD's water supply that is not for current use within its service area or delivered to storage in Pardee or Camanche reservoirs is released downstream and is no longer available for EBMUD's use. During dry years, runoff amounts are not sufficient to meet user demands and the EBMUD supply must be drawn from reservoir supplies stored during previous years. During extended dry periods, such as the 1976–1977 and 1987–1992 droughts, storage has been insufficient to supply all consumptive needs of EBMUD customers without significant rationing and to meet EBMUD's downstream obligations. Projected increases in the demand for Mokelumne River water by other users and incremental growth in the EBMUD service area are anticipated to further decrease EBMUD's



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Figure 2-2
Location of the Folsom South Canal

available water supply during droughts, thereby increasing the need for water rationing. Additionally, the intensive water conservation and reclamation measures currently in effect are reducing EBMUD's water supply needs during normal seasons, and options for further reducing this demand during droughts through additional measures are limited.

Program Development and Implementation

On October 26, 1993, the EBMUD Board of Directors adopted the Updated WSMP and associated EIR (EDAW 1992, 1993). The purpose of the Updated WSMP was to identify the actions and projects necessary to provide adequate protection and enhancement of the lower Mokelumne River fishery in balance with an adequate water supply for EBMUD customers through 2020. The following water supply problems and challenges were identified and addressed in the Updated WSMP:

- The number of EBMUD customers is projected to increase; therefore, EBMUD's demand for water is expected to increase unless some action is taken.
- The demand for Mokelumne River water by users other than EBMUD customers is projected to increase.
- EBMUD faces possible reduction in supply due to increased allocation of water to lower Mokelumne River resources, including fisheries.
- The number of salmon in the lower Mokelumne River has been reduced.
- EBMUD faces possible shortages of water during droughts.
- Provide adequate capacity, flexibility, and reliability to respond to the problems and challenges of maintaining the EBMUD water supply.
- Minimize total direct costs to EBMUD customers.
- Maintain the high quality of the water supply. This includes taking steps to ensure that EBMUD's potable water will meet all existing and anticipated drinking water standards and that EBMUD's nonpotable water is of quality suitable to its use.
- Protect and improve the biological resources that could be affected by existing EBMUD facilities or by the Updated WSMP.
- Maintain outdoor recreation opportunities.
- Minimize risks to public health and safety.
- Minimize adverse sociocultural impacts.

The Updated WSMP included six alternative Composite Programs. The Composite Program adopted by the EBMUD Board of Directors consists of five major components to assist EBMUD in satisfying these objectives:

- a seismic strengthening program for the Mokelumne Aqueducts,
- an aggressive water conservation program,
- a wastewater reclamation and reuse program,
- a Lower Mokelumne River Management Plan (LMRMP), and
- a supplemental water supply project.

In recognition of these concerns, the Updated WSMP established the following planning objectives:

The aqueduct seismic strengthening, water conservation, water reclamation, and LMRMP components are currently in various stages of

implementation as discussed in the following sections.

Mokelumne Aqueduct Seismic Upgrade Program

The Mokelumne Aqueduct Seismic Upgrade Program will retrofit one of EBMUD's three parallel pipelines that cross the Sacramento-San Joaquin Delta. In its 1993 Findings on the Updated WSMP (East Bay Municipal Utility District 1993a), the EBMUD Board of Directors determined that EBMUD's long-range water supply planning process shall address the need for increased security of the EBMUD's Mokelumne Aqueducts and directed that as a component of the Updated WSMP, staff should proceed with development of a specific project, including appropriate project-level environmental documentation for the Mokelumne Aqueduct Seismic Upgrade Program. The project called for strengthening the elevated segments of Mokelumne Aqueduct No. 3 against a maximum credible earthquake where it crosses the Delta; securing the stretches of pipeline that pass under river channels within the Delta; and protecting the pipelines and foundations against flood damage caused by levee failures.

Preliminary design for the project was developed between 1994 and mid-1995. EBMUD began the environmental documentation and permitting for the project in mid-1995. The EBMUD Board of Directors approved a project-specific mitigated negative declaration for the project in May 1996 (East Bay Municipal Utility District 1996a). Construction of the seismic upgrades will be completed between early 1998 and mid-1999.

Demand Management - Conservation and Reclamation

The Board of Directors determined to continue to promote conservation through implementation of Conservation Level II, described in Volume I, Chapter 7, pages 7-16

through 7-17 of the Updated WSMP EIR (EDAW 1993). In its 1993 Findings on the Updated WSMP (East Bay Municipal Utility District 1993a), the EBMUD Board of Directors directed staff to proceed with Conservation Level II with the objective of achieving a net reduction in potable water demand of 13 MGD by 2020, over and above water savings achieved from existing and previously adopted conservation programs. Such a reduction will decrease by 43% the 30-MGD increase in EBMUD demand projected between 1990 and 2020. The Board of Directors found that implementation of Conservation Level II would not have a significant adverse effect on the environment.

The Board of Directors also determined to promote the use of reclaimed water through Reclamation Alternative A1, as described in Volume I, Chapter 7, pages 7-17 through 7-24 of the EIR. In its 1993 Findings on the Updated WSMP (East Bay Municipal Utility District 1993a), the EBMUD Board of Directors directed staff to proceed with implementation of Reclamation Alternative A1 with the objective of achieving a potable water demand reduction of 8 MGD by 2005 through the use of reclaimed water. This program was described in Volume I, Chapter 7, pages 7-17 through 7-24 of the EIR (East Bay Municipal Utility District 1993a). The Board of Directors found that, according to the information provided in the EIR, no significant environmental impacts would result from implementation of Reclamation Alternative A1 with the implementation of appropriate mitigation measures.

As part of the Updated WSMP, the EBMUD Board of Directors examined several alternative components for addressing demand management. Five levels of conservation were considered, ranging from an estimated savings of 7 MGD (Conservation Level I) to 40 MGD (Conservation Level V). All these potential program components were carried forward from the initial screening process and examined further. Two components (Level II and IV)

were included in the six Composite Programs that were analyzed in detail as alternatives in the Updated WSMP EIR.

Additionally, 13 levels of water reclamation were considered in early project planning. Of these 13 potential programs, seven were held from further consideration during the Updated WSMP EIR process because they were determined to be infeasible or to result in significant environmental impacts. Six were carried forward and examined further, and three were included in the six "Composite Programs" that were analyzed in detail as alternatives in the Updated WSMP EIR.

One of the alternatives that was not selected for implementation was "Composite Program I," including "Conservation Level IV" and "Reclamation Alternatives A2 and A6," which placed total reliance on demand-side management measures for addressing projected water shortages through 2020 and therefore relied exclusively on aggressive conservation and reclamation. As described in volume I, Chapter 7, pages 7-10 through 7-24 of the Updated WSMP EIR (EDAW 1993), these measures would have included imposing deficiencies on customers of up to 35% during droughts, including up to 50% for residential customers, rather than the 25% limit that is EBMUD's policy. Composite Program I also would have required expansion of reclaimed water use to meet 25% of new institutional/commercial/industrial demand and to offset the potable water demand of some existing commercial and industrial users. Additionally, 95% of new multi-family and 85% of new single-family residential development east of the Oakland/Berkeley Hills would have been required to be constructed with dual distribution systems for irrigation with nonpotable water

In its 1993 Findings on the Updated WSMP (East Bay Municipal Utility District 1993a), the EBMUD Board of Directors identified several disadvantages presented by Composite Program I, including the significant uncertainty

of achieving program objectives and the potential for social and economic impacts. Estimates of water demand reductions projected to result from Composite Program I were based on data from existing programs, some of which were developed only recently and provided limited information with which to evaluate results. Neither the extent of customer participation nor the long-term acceptance of use reduction measures identified in Composite Program I has been tested. The estimates of customer participation and potential water savings from mandatory measures may have been higher than what could actually be achieved.

To obtain the high water use savings projected under Composite Program I, complex administrative and enforcement measures would have been needed to monitor and control water demand. Customers would have increased difficulty in meeting annual water use reduction goals during drought years (up to 50% for residential customers). These goals exceeded the level of water use reduction achieved during the 1976-1977 drought when widespread loss of landscaping and other lifestyle and economic impacts occurred. No other water districts were known to have implemented conservation programs on the scale that would have been required under Composite Program I.

The extensive construction required to implement the reclamation components would result in the most disruptive construction activity of the alternatives considered. The large reclaimed water distribution network also would have posed the potential for cross-connection of reclaimed water with the potable water supply.

Based on the information presented to it, the EBMUD Board of Directors determined that Composite Program I did not meet the Updated WSMP planning objectives as well as did some other project alternatives and withheld it from further consideration. Based on the effects of Composite Program I, uncertainty of results,

and the Board Findings, additional conservation and reclamation are not considered as an alternative in Chapter 3.

Water Conservation. EBMUD continues to actively participate in a statewide process of policy planning on conservation practices and has completed a water conservation master plan (East Bay Municipal Utility District 1994). A group of water agencies, public interest groups, and other interested parties proposed various water conservation measures as "Best Management Practices" (BMPs) to achieve timely, effective water conservation by urban users throughout California. A statewide Memorandum of Understanding (MOU) to implement the BMPs was signed by EBMUD in 1993 (East Bay Municipal Utility District 1993b).

The MOU prescribes an activity-based approach for water agencies to implement water conservation measures and a schedule for implementation. The 14 BMPs in the newly revised MOU address water audits, retrofit and incentive programs, metering requirements, leak detection, pricing, water waste prohibitions, and educational programs. Potential BMPs identified for future study include retrofit of car washes, replacement of existing home appliances, and gray water systems. EBMUD's participation in the MOU and implementation of cost-effective BMPs represent one element of EBMUD's commitment to efficient water use.

Water Reclamation. Since the mid-1960s, EBMUD has conducted water reclamation studies. At first, water reclamation was considered primarily for reducing wastewater discharges to San Francisco Bay. The more recent emphasis in water reclamation has expanded to reducing demand on drinking water supplies and increasing reliability of water supply during drought. EBMUD has completed a draft water reclamation master plan (East Bay Municipal Utility District 1991) and currently has nine water reclamation projects in place that are anticipated to result in savings of

approximately 6 MGD by 2020. Additionally, EBMUD is preparing a Water Reclamation Implementation Plan (WRIP) that will be a comprehensive plan for implementing future water reclamation projects. Future water reclamation efforts are anticipated to reduce demands by an additional 8.3 MGD.

EBMUD has also adopted Policy 73 - Nonpotable Water (April 9, 1996), which requires that customers of EBMUD use nonpotable water for nondomestic purposes when it is of adequate quality and quantity, available at a reasonable cost, not detrimental to public health, and noninjurious to plant life, fish, and wildlife.

Summary of EBMUD's Demand and Supply Projections. Table 2-2 shows projected EBMUD customer demands through 2020 and adjusts these demands based on existing and future conservation and reclamation efforts. As noted in the table, although total demands for water would be expected to increase from 230 MGD in 1995 to 277 MGD in 2020, based on normalized 1990 conditions, EBMUD supply requirements are projected to increase from 222 MGD to 228 MGD during the same period because of the conservation and reclamation efforts undertaken by EBMUD.

EBMUD Urban Water Management Plan. In February 1996 EBMUD prepared and adopted an updated and revised Urban Water Management Plan (UWMP) as required by the state Urban Water Management Planning Act, which implements the state's policy to achieve conservation and efficient use of urban water supplies to protect both the people and water resources of the state. EBMUD adopted the first UWMP in 1985. The UWMP documents past water conservation and reclamation measures implemented by EBMUD, currently measures being implemented, and programs measures being investigated for potential future strategies. The conservation and reclamation measures identified in the Updated WSMP are included in the UWMP (East Bay Municipal

Table 2-2. Summary of EBMUD's Demand and Supply Projections (MGD)						
	1995	2000	2005	2010	2015	2020
Customer demand (adjusted for accounts) ^a	230	239	249	258	268	277
Adjusted for conservation ^b						
Natural replacement of ultra low flush toilets	-0.7	-4	-7.3	-10.6	-13.9	-18.6
EBMUD's existing and adopted conservation program	-1.4	-4.6	-7.7	-10.9	-14.1	-16.1
Adjusted for reclamation						
EBMUD's existing and adopted reclamation program ^c	-5.9	-5.9	-5	-5.9	-5.9	-5.9
Potential water reclamation		-4.3	-8.3	-8.3	-8.3	-8.3
Oakland/Berkeley			-1.2	-1.23	-1.2	-1.2
San Leandro/Alameda-Phase III			-0.8	-0.8	-0.8	-0.8
Hercules/Franklin Canyon-Phase I		-0.4	-0.4	-0.4	-0.4	
Hercules/Franklin Canyon-Phase I			-2	-2	-2	-2
San Ramon Valley		-2.8	-2.8	-2.8	-2.8	-2.8
Central Contra Costa		-1.1	-1.1	-1.1	-1.1	-1.1
Planning level of demand	222	220	220	222	226	228
Available supply (existing sources)						
Normal year	>222	>220	>220	>222	>226	>228
Dry year (10% deficiency)	200	198	198	200	203	205
Notes:						
^a Account growth from 330,000 in 1984 to 358,000 in 1995 (8%). Average of FY 1984, 1985, and 1986 = 214 MGD x 1.08 = 230 MGD, 2020 demand from WSMP projection.						
^b 2020 savings taken from June 1994 Water Conservation Master Plan (Exhibit 7-1). Linear savings assumed for a 26-year program.						
^c WSMP TA-D2, Attachment A, P.2 Exhibit 1, with Office of Reclamation updated numbers.						
Source: East Bay Municipal Utility District 1996.						

Utility District 1996c), which is available for public review at EBMUD's headquarters in Oakland, California, for further information on EBMUD's demand management programs.

Lower Mokelumne River Management Plan

Lower Mokelumne River flows required for protection of fisheries are provided pursuant to

the LMRMP, which was developed as part of the Updated WSMP to:

- document EBMUD's commitment to protecting public trust resources,
- contribute to developing EBMUD's definition of its need for water, and
- balance EBMUD's water supply needs with in-river needs.

The LMRMP also identified the following specific goals:

- maintain water supply reliability by minimizing unnecessary storage releases using intensive monitoring and real-time management;
- sustain and enhance fisheries benefits, especially salmon and steelhead trout, and other aquatic and riparian resources; and
- recognize and reduce uncertainty and develop new opportunities through a comprehensive and flexible monitoring and research program.

The LMRMP specifies flow regimes and reservoir and hatchery operations designed to benefit fishery resources. The LMRMP flow regime increases downstream flow releases for fisheries. However, at the time the Updated WSMP was adopted EBMUD and resource agencies, USFWS and DFG, did not agree on the specific flows required for fishery resources.

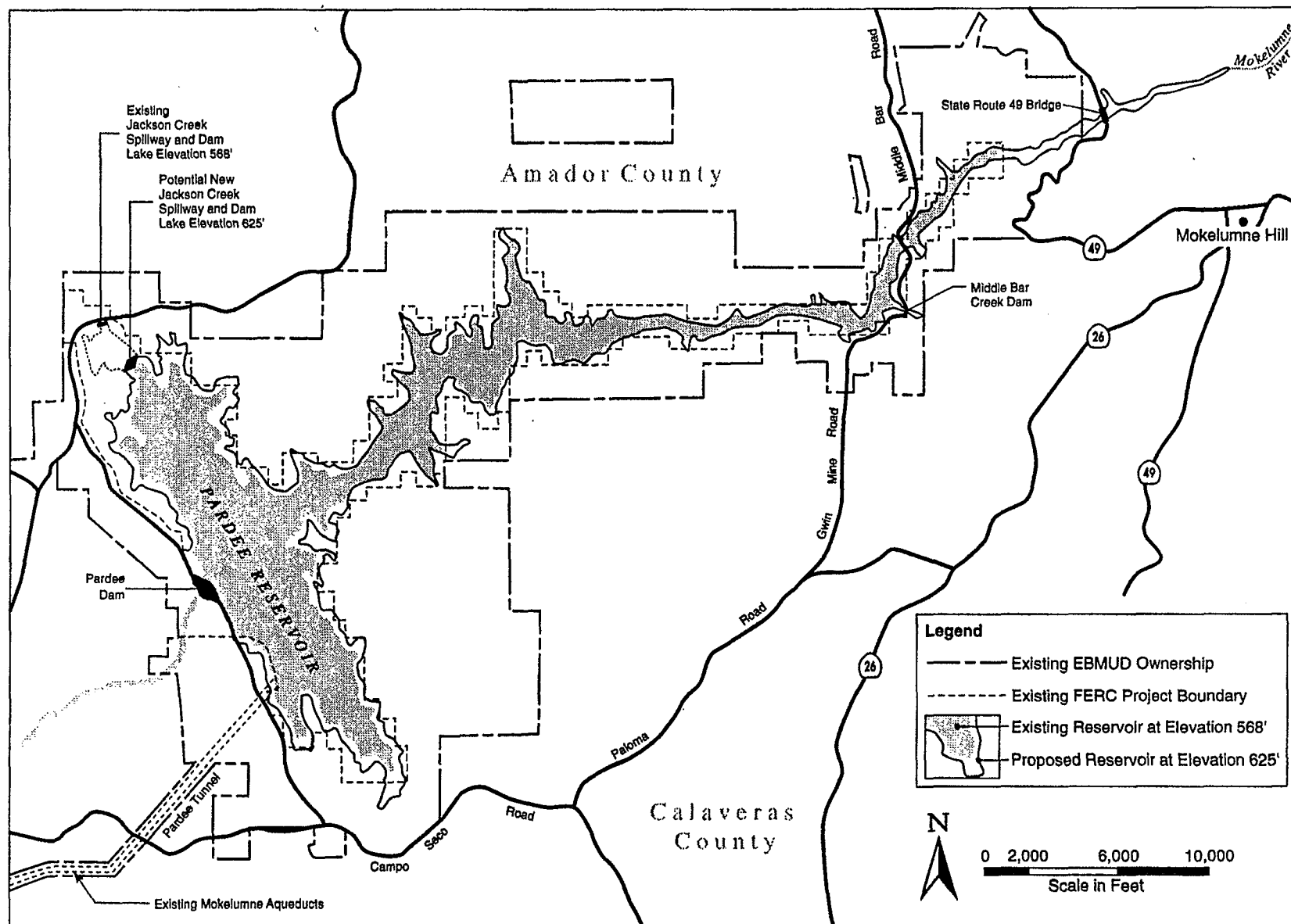
The Updated WSMP defined EBMUD's Need for Water assuming implementation of the LMRMP. The Need for Water is the additional amount of water required during EBMUD's drought planning sequence to limit rationing to 25% of normal water demand levels at projected 2020 levels. Consistent with this definition, the Updated WSMP computed Need for Water as 130,000 AF over the 3-year drought period (EDAW 1992, 1993). However, subsequent

factors have caused this estimate to increase since the adoption of the Updated WSMP.

The first factor is a result of a rerating of the storage capacity of Camanche and Pardee reservoirs, which occurred following a dry period during which EBMUD was able to better study actual capacity. The study resulted in a 23,000-AF decrease in the rated storage capacity of the Camanche Reservoir and a 12,000-AF decrease in Pardee Reservoir. Another factor increasing the Need for Water is the settlement of the ongoing Federal Energy Regulatory Commission (FERC) Proceeding. In 1991, FERC initiated a license modification proceeding to determine if modifications to EBMUD's project facilities or operations were appropriate to benefit fish and wildlife resources in the lower Mokelumne River. In 1993, FERC released a final environmental impact statement.

EBMUD, U.S. Fish and Wildlife Service (USFWS), and DFG have participated in settlement discussions in an effort to resolve issues in dispute in the license modification proceeding. These negotiations resulted in the parties' approval of "Principles of Agreement" in February 1996. In June 1997, the parties approved the Joint Settlement Agreement to resolve all issues in this proceeding and requested FERC to make its final determination in this matter. In addition to the effect of rerating both Pardee and Camanche reservoirs, implementation of the Joint Settlement Agreement increases the Need for Water to approximately 185,000 AF.

Other potential instream flow requirements for the lower Mokelumne River have also been proposed. These include flow requirements that may be imposed as a result of the Bay-Delta Proceedings or implementation of the Central Valley Project Improvement Act. EBMUD has determined that the instream flow requirements accounted for in the Mokelumne River Joint Settlement Agreement provide reasonable



increases in flow to fulfill EBMUD's obligations in these other proceedings.

Supplemental Water Supply

Identification and implementation of the Supplemental Water Supply Project has proven complex. In 1993, the preferred supplemental water supply project was a conjunctive-use project involving groundwater banking of Mokelumne River water in the eastern San Joaquin County groundwater basin; however, other options such as enlarging Pardee Reservoir, creating a new storage reservoir in the Sierra, and connecting to the American River were also considered (East Bay Municipal Utility District 1993a).

With the Mokelumne River conjunctive-use project, EBMUD would use excess Mokelumne River flows during wet years to recharge a portion of the San Joaquin County groundwater basin. EBMUD would then extract water from the basin during dry years when the availability of river flows would be limited and to meet water supply needs during a planned outage. A Pardee Reservoir enlargement project would involve increasing the storage capacity of Pardee Reservoir. Middle Bar Creek, upstream of Pardee Reservoir, was determined to be the preferred location for a potential new dam and storage reservoir in the Sierra. The conceptual Pardee Reservoir enlargement project, as considered in the Updated WSMP, and the location of a Middle Bar Creek reservoir are depicted in Figure 2-3. The added storage capacity provided by an enlarged Pardee Reservoir or new reservoir would provide EBMUD with additional flexibility in regulating reservoir storage for use during dry periods; however, because they would not provide a supply from a source independent of the Mokelumne River system, they would not create system redundancy or an alternative supply for use during a planned or unscheduled outage of Pardee Reservoir facilities.

Program-level environmental impact analysis performed for the Updated WSMP concluded that significant impacts related to loss of wetlands, effects on wildlife, and flooding of existing rapids on the Mokelumne River upstream of Pardee Reservoir could occur with the Pardee Reservoir enlargement project. Some of these potential effects could possibly be avoided by construction of a new dam downstream of the existing Pardee Dam. Studies of that option are only preliminary. The Pardee Reservoir enlargement project would also require many approvals and, if jurisdictionally feasible, could not be implemented by the goal implementation date of 2001 for the currently proposed Supplemental Water Supply Project.

Extensive screening for a new reservoir was undertaken during preparation of the Updated WSMP. Forty-seven reservoir sites in 19 different geographical locations, including sites in Amador, Calaveras, Sacramento, Solano, San Joaquin, Alameda, and Contra Costa counties, were evaluated. Evaluation and disposition of the full range of additional water storage alternatives, which include increased capacity from 3,000 AF to 200,000 AF, was described in Volume I, Chapter 6, pages 6-5 through 6-9; Volume IV, Technical Appendix C, pages C-42 through C-53; and Volume V, Technical Appendix E1 of the EIR. Certain reservoir storage alternatives were excluded from further consideration because of geologic and hydrologic hazards and technical infeasibility, as described in Volume IV, Technical Appendix C, Exhibit 24 of the EIR. The Updated WSMP concluded that the Pardee Reservoir Enlargement Project would be the preferred surface storage alternative if additional Sierra storage was pursued.

The feasibility of Mokelumne River water conjunctive use is currently uncertain, based primarily on the unsuccessful efforts to negotiate a mutually acceptable agreement with San Joaquin County interests. Negotiations began in 1992 with seven San Joaquin County

entities: the cities of Stockton and Lodi, the Woodbridge Irrigation District, the North San Joaquin Water Conservation District, Stockton East Water District, Central San Joaquin Water Conservation District, and the County of San Joaquin.

The obstacles to agreement center on the degree of responsibility that EBMUD would assume for the regulation of storage and reversing overdraft in the eastern San Joaquin groundwater basin. As articulated in the San Joaquin parties' 1996 "Principles for Further Negotiation," this responsibility is manifested as both a minimum acceptable groundwater elevation and an open-ended EBMUD financial liability for construction of additional facilities until the San Joaquin parties' groundwater elevation and saline mitigation goals are met. A minimum supply of 300,000 AF per year to the San Joaquin parties is specified, precluding a supply from the Mokelumne River alone. Because EBMUD would be a net groundwater recharger, and because anticipated EBMUD extractions would amount to less than 2% of Countywide groundwater pumping, EBMUD is concerned about accepting responsibility for actions that are largely beyond its control. Lack of progress during negotiations, combined with growing concerns over project timing, resulted in adoption of the updated WSMP Action Plan (described below), which calls for investigation into other water supply options.

EBMUD continues to explore opportunities for groundwater banking in San Joaquin County and is currently participating in a single-well groundwater injection pilot project with San Joaquin parties.

Updated WSMP Action Plan

Based on the difficulties and changed conditions described above, the EBMUD Board of Directors directed staff to pursue other supplemental supply options. The resulting Updated WSMP Action Plan (East Bay Municipal Utility District 1995) focuses on

multiple water supply options, including multiparty regional projects, and calls for the following four actions:

- Initiate preliminary design, prepare project-level environmental documentation, and initiate applicable permit processes and Reclamation contract modifications (as needed) for a pipeline connection between the FSC and the Mokelumne Aqueducts for delivering water to the customers of EBMUD as a standalone project not dependent on any additional water supply project components.
- Continue negotiations with San Joaquin County interests on a joint EBMUD–San Joaquin County conjunctive-use project to provide additional storage to meet EBMUD's need for additional water.
- Initiate discussions with Sacramento-area interests on a potential joint EBMUD–Sacramento-area conjunctive-use project to provide additional storage to meet EBMUD's need for additional water. This project would include negotiations with the Sacramento area Water Forum and San Joaquin County interests on a multiregional water solution.
- Initiate project-level studies for raising Pardee Dam to provide additional storage to meet EBMUD's need for additional water, while simultaneously evaluating creation of Middle Bar and Duck Creek reservoirs as possible alternatives to expanding Pardee Reservoir and make further recommendations as to the best reservoir option by December 1995. (In November 1995, enlargement of Pardee Reservoir was determined to be the best available option for increasing Mokelumne River storage capacity should additional Sierra storage be pursued.)

After further preliminary evaluation of the Pardee Reservoir Enlargement Project and

continued unsuccessful efforts to implement a conjunctive use program, the Board of Directors decided to make use of its Reclamation water service contract as a supplemental water supply and released a Notice of Preparation of an EIR (EDAW 1996).

SUPPLEMENTAL WATER SUPPLY PROJECT OBJECTIVES

The objective of the project is to allow EBMUD to make use of its water service contract with Reclamation for delivery of American River water, consistent with the conditions set forth in the Hodge Decision, so as to achieve all of the following:

- maintain the high quality of EBMUD's raw and treated water supply;
- increase system reliability by providing a reliable alternate source of supply to EBMUD's Mokelumne River supply in case of a catastrophic event or scheduled major maintenance at Pardee Dam or Reservoir;
- provide increased operational flexibility;
- reduce customer deficiencies;
- increase opportunities for protection and enhancement of Mokelumne River resources; and
- contribute to achieving EBMUD's planning objectives established as part of the updated WSMP.

As noted in the second objective, EBMUD is in need of an alternative water supply to ensure uninterrupted service to its customers. EBMUD obtains approximately 95% of its current water supply from the Mokelumne watershed through diversion at Pardee Reservoir. The Mokelumne River watershed is a single watershed with little potential for contamination of runoff, and water obtained from this source is of very high quality. If

Pardee Dam or Reservoir is damaged, such as in the case of a natural disaster, or if major scheduled repair or maintenance of storage or diversion facilities is required, most of EBMUD's water supply could be interrupted. EBMUD must then obtain its full needed supply from the terminal storage reservoirs within its service area. The amount of water available within these reservoirs is limited. Under current conditions, if the terminal reservoirs could not provide an adequate supply to meet customer demand until Pardee Reservoir and Dam and EBMUD's delivery and conveyance facilities resumed operation, no other source of water would be available to EBMUD and its customers could experience severe shortages in supply. Use of terminal reservoir supplies could also substantially reduce the amount of storage available for use during subsequent dry seasons. Provision of a supplemental water supply not dependent on operation of Pardee facilities could reduce this risk of diminished supplies during emergencies or other facility shutdowns.

EBMUD anticipates that a planned outage to rehabilitate Pardee Reservoir facilities would likely require no more than a total of 12 months in a 20-year period and likely not more than 6 months for each occurrence.

Chapter 3. Potential Project Alternatives

SELECTION OF POTENTIAL ALTERNATIVES

This alternatives screening report covers a full range of alternative projects consistent with the project purpose and objectives stated in Chapter 2. The alternatives considered include a connection between the FSC and the Mokelumne Aqueducts and alternatives suggested by potential project participants and other interested parties during the continued water supply planning efforts initiated by EBMUD.

This chapter provides a general description of each alternative under consideration. Much of the information used in the alternatives descriptions was obtained from the Folsom South Canal Connection (FSCC) Siting and Alignment Study (S/A Study) (CH2M Hill and Montgomery Watson 1996); the EIR for the Updated WSMP (EDAW, Inc., 1992, 1993); the WSMP Third Annual Implementation Status Report (East Bay Municipal Utility District 1996c); a series of workshops, conducted by EBMUD in 1995, 1996, and 1997; and contributions by potential joint project participants.

The development of alternatives was also influenced by EBMUD's existing treatment system capabilities and the quality of potential alternative water supply sources. EBMUD's existing treatment system and water quality issues associated with potential alternatives supply sources are described in Attachment A. The screening process used to assess the alternatives described below is documented in Chapter 5 of this report.

EBMUD-ONLY PROJECT ALTERNATIVES

The following alternatives could be implemented by EBMUD independently and would not require substantial coordination or

special agreements (other than issuance of permits) with other jurisdictions or agencies. (Joint projects that would be implemented under direct coordination and agreement with other jurisdictions are evaluated subsequently.)

American River Delivery through the Folsom South Canal

As described in Chapter 2 of this report, Reclamation currently diverts American River water into the FSC at Lake Natoma (Nimbus Dam). An alternative involving connection to and water conveyance from the FSC would allow EBMUD to take delivery of up to 150,000 AF/year of American River water, in accordance with the existing EBMUD-Reclamation water service contract and the conditions set forth in the Hodge Decision (1990). Besides providing a supplemental drought supply, this alternative also would provide a water supply in case of a planned outage at Pardee Reservoir. During such an event, EBMUD may need to take delivery of its entire Mokelumne Aqueduct demand (350 cfs) from the FSC for up to 6 months.

To better define conveyance alignment options for this alternative, EBMUD prepared the preliminary design-level Siting and Alignment Study, which identified three potential buried pipeline alignments—Pipeline Alignment 1, Pipeline Alignment 2, and Pipeline Alignment 3—and a potential open canal alignment. Subsequent studies performed by EBMUD identified a fourth potential alignment, Alignment 4. As depicted in Figure 3-1, Pipeline Alignment 1 originates at EBMUD's existing FSC turnout at Grant Line Road in Sacramento County and generally follows a railroad right-of-way south to the Mokelumne Aqueducts. Pipeline Alignment 3 is essentially a variation of Pipeline Alignment 1. Pipeline Alignment 3 begins near the southern terminus of the FSC and heads

generally west to connect with the southern portion of Pipeline Alignment 1. Pipeline Alignment 2 originates at or near the end of the FSC and connects with the Mokelumne Aqueducts east of Pipeline Alignments 1 and 3. Alignment 4 originates at the Grant Line Road FSC turnout at the same location as Alignment 1, crosses to the east side of the FSC, and generally follows roadways south to connect with and follow Alignment 2 to the Mokelumne Aqueducts. An open canal alignment also originates at the end of the FSC and connects with the Mokelumne Aqueducts.

EBMUD has undertaken a significant effort to identify the most feasible FSCC conveyance facility. This effort has entailed assessing engineering and environmental information and completing an iterative process to analyze the potential environmental and engineering constraints associated with each alignment. In completing this effort, EBMUD used a geographic information system-based software program, "Pipebase," developed in 1997 by Diba Consulting Software Engineers, to evaluate and compare how well the potential alignments meet engineering and environmental constraints and to select the most practical alignment.

Because it appears to have the fewest environmental, engineering, and institutional constraints, Pipeline Alignment 2 is the assumed alignment for project alternatives that call for construction of a water conveyance connection from the FSC to the Mokelumne Aqueducts.

Common Characteristics of the Conveyance Alternatives

Pipeline. The water conveyance pipeline would be identical in general design for the four alignments. The pipeline and pumping plants (described below) could deliver up to 350 cfs to the Mokelumne Aqueducts, which is the rate that would be required to satisfy EBMUD's water demand during a planned outage of Pardee Reservoir operations over a 6-month

period. The pipeline would generally require an 80-foot-wide permanent right-of-way and an additional 50-foot-wide temporary right-of-way during construction, where feasible.

Pumping Plants. The pipeline alignments would involve construction and operation of a canal pumping plant and an aqueduct pumping plant at either end of the pipeline. For Pipeline Alignments 1 and 4, the canal pumping plant would connect with the existing turnout at Grant Line Road. For Pipeline Alignments 2 and 3, a new turnout would be constructed at or near the end of the FSC.

An aqueduct pumping plant would be located at the end of the pipeline alignments at the connection with the Mokelumne Aqueducts to pump water from the pipeline into the Mokelumne Aqueducts for conveyance to EBMUD's service area. Both pumping plants likely would be operated with electricity.

River and Stream Crossings. The pipeline alignments include crossings at Dry Creek and the Mokelumne River. Pipeline Alignment 1 also includes pipeline crossings over Deer Creek and the Cosumnes River. Additionally, both alignments cross minor ephemeral creeks and drainages. River or stream crossings could be constructed by:

- dry tunneling, whereby the pipeline would be installed beneath the river or stream channel;
- constructing bridges, whereby the pipeline would be brought to the surface and directed over water ways; or
- extending the pipeline across water ways within an open channel through cut and trenching.

Treatment Requirements. Although American River water at Nimbus is of very high quality (see Chapter 5 and Attachment A), to comply with all applicable state water quality requirements, it is anticipated that this

alternative would require expansion of EBMUD's existing in-line water treatment facilities. Improvements would be made to the Walnut Creek, Lafayette, and Orinda water treatment plants (WTPs), all located in the EBMUD service area. These improvements would include new flocculation and solids management facilities constructed within the existing compound of each facility.

Description of the Conveyance Alternatives

Pipeline Alignment 1. Pipeline Alignment 1 follows a near-direct route from the FSC to the Mokelumne Aqueducts (Figure 3-1). This alignment originates at the existing EBMUD turnout on the west bank of the FSC at Grant Line Road, follows Grant Line Road for approximately 3 miles, and turns southeast to cross Deer Creek and the Cosumnes River. From the Cosumnes River crossing, this alignment turns southwest to the Central California Traction (CCT) railroad easement and follows the easement, which varies in width from 50 to 100 feet south, turning east to connect with the Mokelumne Aqueducts approximately 4,000 feet north of the CCT railroad and aqueduct intersection. The estimated total length of Pipeline Alignment 1 is approximately 34 miles.

Pipeline Alignment 2. Pipeline Alignment 2 is an approximately 16.5-mile-long facility that begins at the southern end of the FSC (Figure 3-1). From the FSC, it extends south to a private access road to a dairy and turns east, following the private road to Clay Station Road. The alignment continues along the west side of Clay Station Road to Borden Road. The alignment traverses Borden Road to the east side of Clay Station Road and continues along Clay Station Road to Angrave Road. From Angrave Road, the alignment continues east to Dry Creek. South of Dry Creek, the alignment continues southwest to a Pacific Gas and Electric Company (PG&E) transmission line right-of-way. The alignment follows the PG&E transmission lane right-of-way to its

intersection with Highway 88. The alignment continues southeast from Highway 88 to a point just north of Buena Vista Road where it turns south and crosses the Mokelumne River downstream of the Camanche Reservoir spillway.

South of the Mokelumne River, the alignment follows the river bank and turns southeast, crossing through EBMUD's Camanche Reservoir property to Highway 12. At Highway 12, the alignment continues south, crossing Highway 12 and following the west side of Cord Road to Acampo Road. From Acampo Road, the alignment extends 4,500 feet to the aqueduct pumping plant site.

Pipeline Alignment 3

Alignment 3 is approximately 23 miles long, extending south from near the FSC terminus to the Mokelumne Aqueducts (Figure 3-1). From the FSC, the alignment heads southwest and follows the Union Pacific (formerly Southern Pacific) Railroad right-of-way adjacent to Twin Cities Road. The alignment connects with the CCT right-of-way and then continues south, following Alignment 1 described above.

Pipeline Alignment 4

From the canal pumping plant, the pipeline would parallel the west side of the FSC immediately adjacent to the FSC right-of-way to Sloughhouse Road (Figure 3-1). The pipeline would then turn southwest and parallel Sloughhouse Road for approximately 2,000 feet to a 90-degree turn in Sloughhouse Road. The pipeline would then head southeast, crossing Deer Creek and the Cosumnes River. South of the Cosumnes River, the pipeline heads southeast, crossing the FSC at Clay Station Road. From this point, the pipeline would parallel the west side of Clay Station Road, crossing Highway 104 and continuing south, running west of an unimproved road until reaching the terminus of the FSC. From this

point, the pipeline alignment would be identical to that described above for Pipeline Alignment 2. The total length of Pipeline Alignment 4 is approximately 32 miles.

Open Canal

The S/A Study also defined an alignment for an open, gravity-flow canal. The open canal alignment originates at the end of the FSC and extends south 0.75 mile east of Alabama Road, where it intersects and runs parallel to a power line for about 8,000 feet before crossing Dry Creek and turning south to connect with the Mokelumne Aqueducts at a point approximately 0.5 mile west of Elliott Road. The canal would be concrete lined and have a total length of approximately 16 miles. Inverted siphons would be used at seven locations along the alignment where the canal would be required to cross rivers or large streams. The canal would require construction of 22 bridges at canal and road crossings and an approximately 125-foot-wide permanent right-of-way and an additional, temporary 30-foot-wide right-of-way during construction. An aqueduct pumping plant would be constructed at the canal's connection with the Mokelumne Aqueducts. Besides meeting EBMUD needs, an open canal generally along the described alignment could be used to partially meet San Joaquin water user needs. Water could be delivered to San Joaquin County when the canal is not being used by EBMUD. Because of Reclamation's previously planned extension of the FSC, certain water districts along the canal alignment have facilities in place or partially in place to use surface water from such a canal.

American River Delivery - Intake Upstream of I-5 Bridge

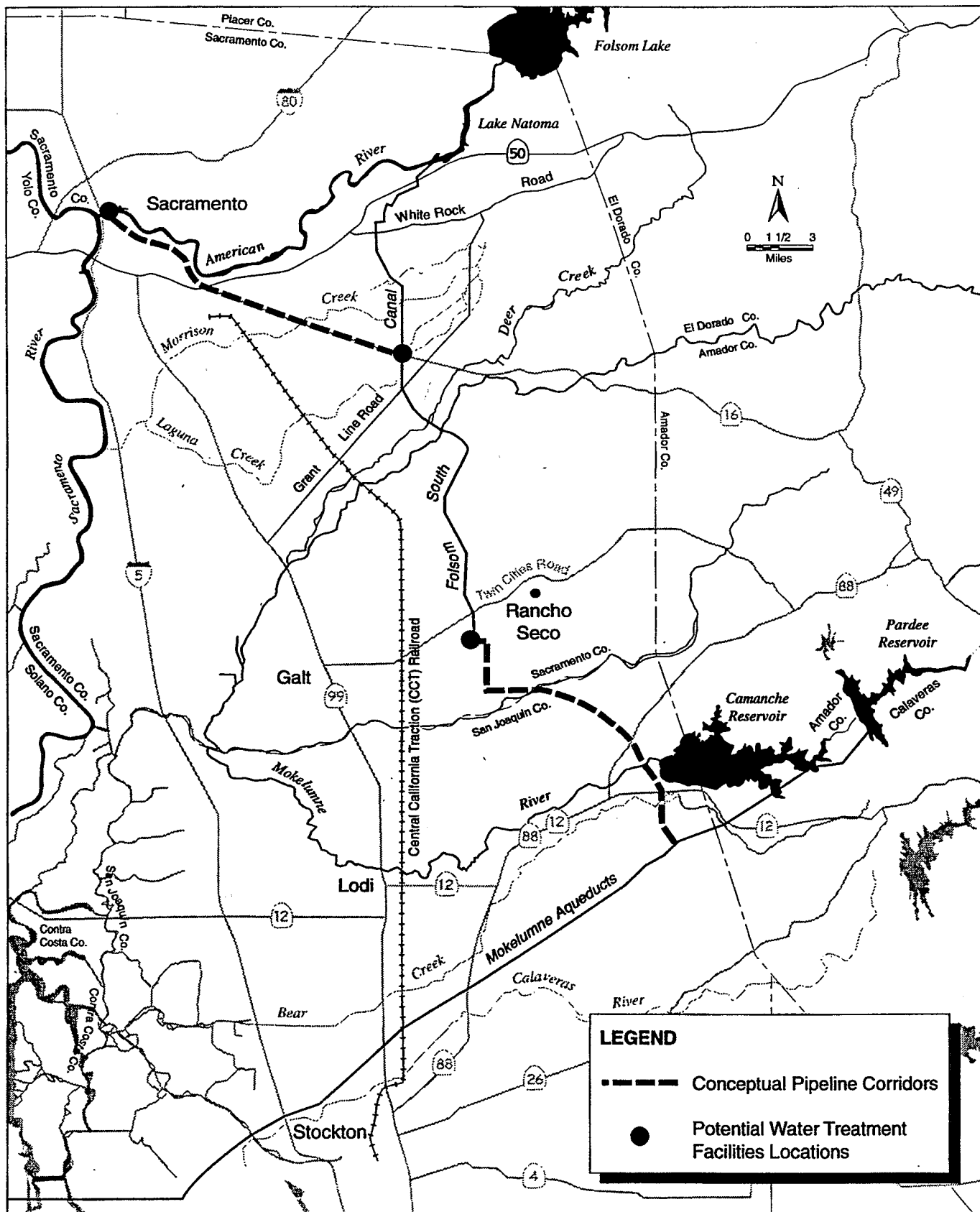
This alternative is depicted in Figure 3-2. Under this EBMUD-only alternative, EBMUD would take delivery of American River water just upstream of the Interstate 5 (I-5) bridge. Taking delivery of water at this location would require construction of a new intake structure

and installation of a pipeline from the confluence generally southeast to the FSC. Another pipeline would be installed to convey water from the end of the FSC to the Mokelumne Aqueducts. As with the pipeline alignments described above, an aqueduct pumping plant would be constructed at the pipeline-aqueduct connection point. Planned outage water needs would be met by taking delivery of water from both the new intake facility and the FSC.

As with the FSC alternatives, this alternative is anticipated to require expansion of EBMUD's existing in-line water treatment facilities. Improvements would be made to the Walnut Creek, Lafayette, and Orinda WTPs in the EBMUD service area. These improvements would include new flocculation facilities, solids management, and other improvements constructed within the existing compound of each facility.

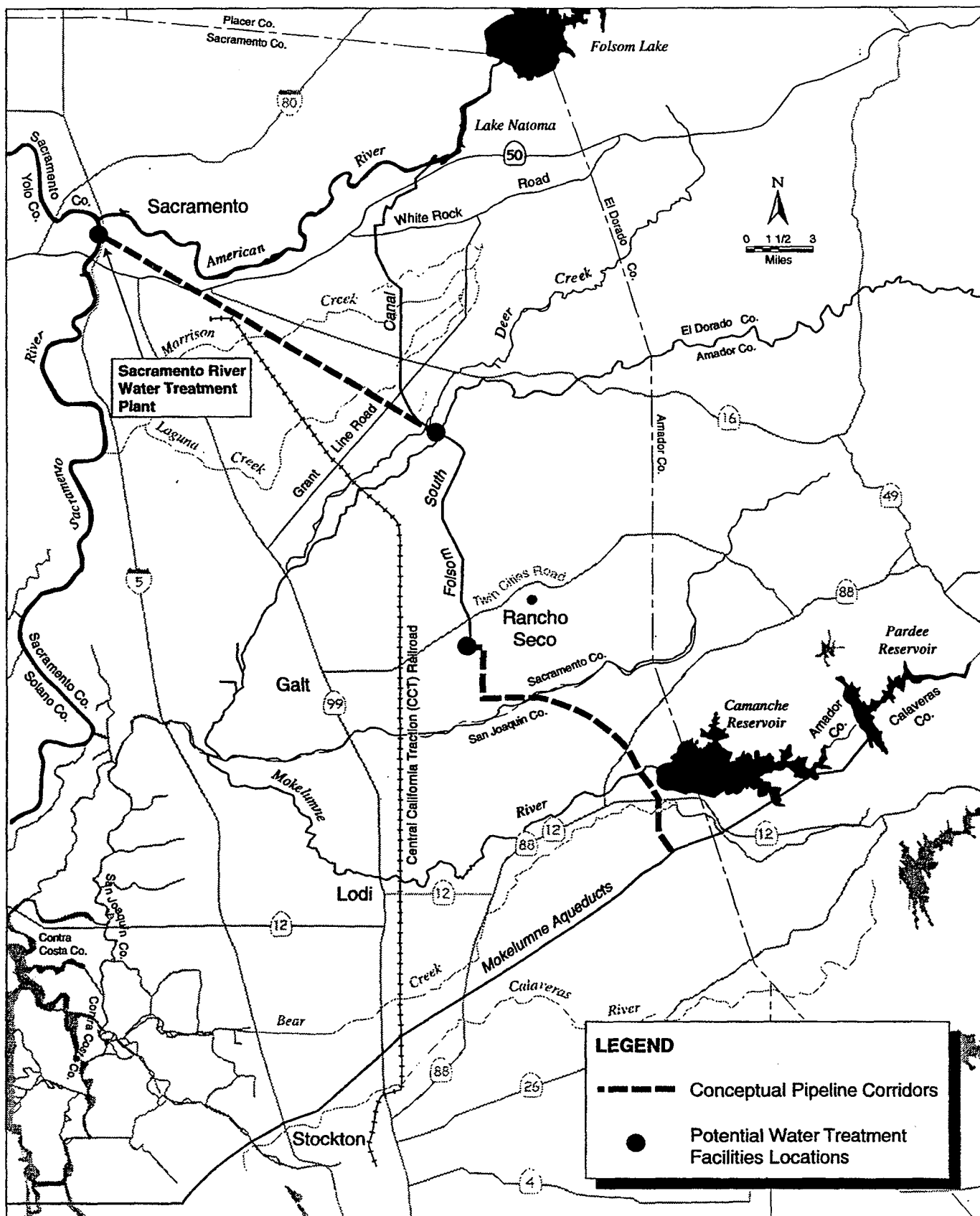
Sacramento River Water Treatment Plant Delivery

Under this alternative, depicted in Figure 3-3, EBMUD would take delivery of its American River allocation from the Sacramento River downstream of the confluence with the American River at the existing City of Sacramento's Sacramento River WTP. This alternative would require construction of a new intake structure and would require installation of a buried pipeline extending generally east to connect with the FSC. Another pipeline (Pipeline Alignment 2, described above) would be installed to convey water from the end of the FSC to the Mokelumne Aqueducts. Because of water quality conditions in the Sacramento River (see the discussion of water quality in Chapter 5 and Attachment A of this report), a new treatment facility, including a membrane filtration pretreatment process followed by reverse osmosis, would be necessary. This new facility would not be located near the intake facility if the FSC is used for conveyance, but would be located closer to the EBMUD service



Jones & Stokes Associates, Inc.

Figure 3-2
Conceptual EBMUD-Only with Intake
Upstream of I-5 Bridge



Jones & Stokes Associates, Inc.

Figure 3-3
Conceptual EBMUD-Only Sacramento River
Water Treatment Plant Delivery

area, as discussed below for the Delta delivery alternative. Planned outage water supply needs would be met by taking water from both the Sacramento River intake and the FSC.

Sacramento River at Freeport Delivery

Under this alternative (Figure 3-4), EBMUD would take delivery of water under its American River contract from the Sacramento River near the town of Freeport. This alternative would require construction of a new intake structure and installation of a new buried pipeline extending east to connect with the FSC. Another pipeline (Pipeline Alignment 2, described above) would be constructed to convey water from the end of the FSC to the Mokelumne Aqueducts. Alternatively, a pipeline could be constructed directly south from Freeport (or Hood), but such an alignment would not change the evaluation of this EBMUD-only alternative. Because of water quality conditions in the Sacramento River, a new water treatment facility, including a membrane filtration pretreatment process followed by reverse osmosis, would be necessary. This new facility would likely not be located near the Sacramento River intake if the FSC is used for conveyance, but would be located closer to the EBMUD service area as discussed for the Delta delivery alternative. Planned outage water supply needs would be met by using water from both the Freeport location and the FSC.

Delta Delivery

With the Delta delivery alternative, EBMUD would obtain its needed supplemental water supply from the Sacramento-San Joaquin Delta. Because of water quality conditions in the Delta, a new water treatment facility, including a membrane filtration pretreatment process followed by reverse osmosis, would be necessary (Figure 3-5). The facility would be sized to meet all EBMUD's needs during a

planned outage at Pardee Reservoir (350 cfs). Major Delta supply facilities would include a low-head pumping plant, appropriate fish screens, a pipeline for conveyance of Delta water to the treatment plant, the treatment plant, a high-head pumping plant and or a separate treated water pipeline to Walnut Creek, and a brine disposal pipeline. Water quality data for the Delta are provided in Attachment A.

JOINT PROJECT ALTERNATIVES

Implementation of a joint project alternative would require coordination and agreement between EBMUD and one or more other jurisdictions. Each of the joint project alternatives to be evaluated was identified in the Updated WSMP or Updated WSMP Action Plan or through ongoing discussions between potential project participants and other interested parties. In addition to meeting EBMUD objectives, these alternatives could meet the objectives of other project partners as well.

Joint Project with the City of Sacramento and the County of Sacramento - Intake Upstream of I-5 Bridge

A potential joint project with the City of Sacramento and County of Sacramento has been identified through ongoing discussions between these jurisdictions and EBMUD. With this alternative, depicted in Figure 3-6, EBMUD would take delivery of American River water through a new intake upstream of the I-5 bridge. The City would increase its intake capacity at the Fairbairn and Sacramento River WTPs. The County would take delivery of water at the new intake upstream of the I-5 bridge. EBMUD, the City, and the County have agreed to study this potential project alternative further.

This alternative would require construction of an intake structure on the American River, installation of a buried pipeline from the new

facility generally southeast to the Fairbairn WTP, expansion of the Fairbairn and Sacramento River WTP facilities to accommodate increased flows, installation of buried pipelines from the Fairbairn WTP to the Sacramento County service area (for County supply) and to the FSC (for EBMUD supply), and installation of a buried pipeline (Pipeline Alignment 2, described above) from the FSC to the Mokelumne Aqueducts. In addition, the capacities of the existing City intake structures at the Fairbairn and Sacramento River WTPs would be expanded. Other system components, such as pumping plants at the FSC and Mokelumne Aqueducts, would also be constructed.

The County would also take water from the new intake. This water would be conveyed via pipeline to Fairbairn WTP for treatment at the City's facilities. Following treatment, this supply would be conveyed generally south for use within the County's service area. The City would increase its diversions from existing intake structures at the Fairbairn and Sacramento River WTPs to meet future demands.

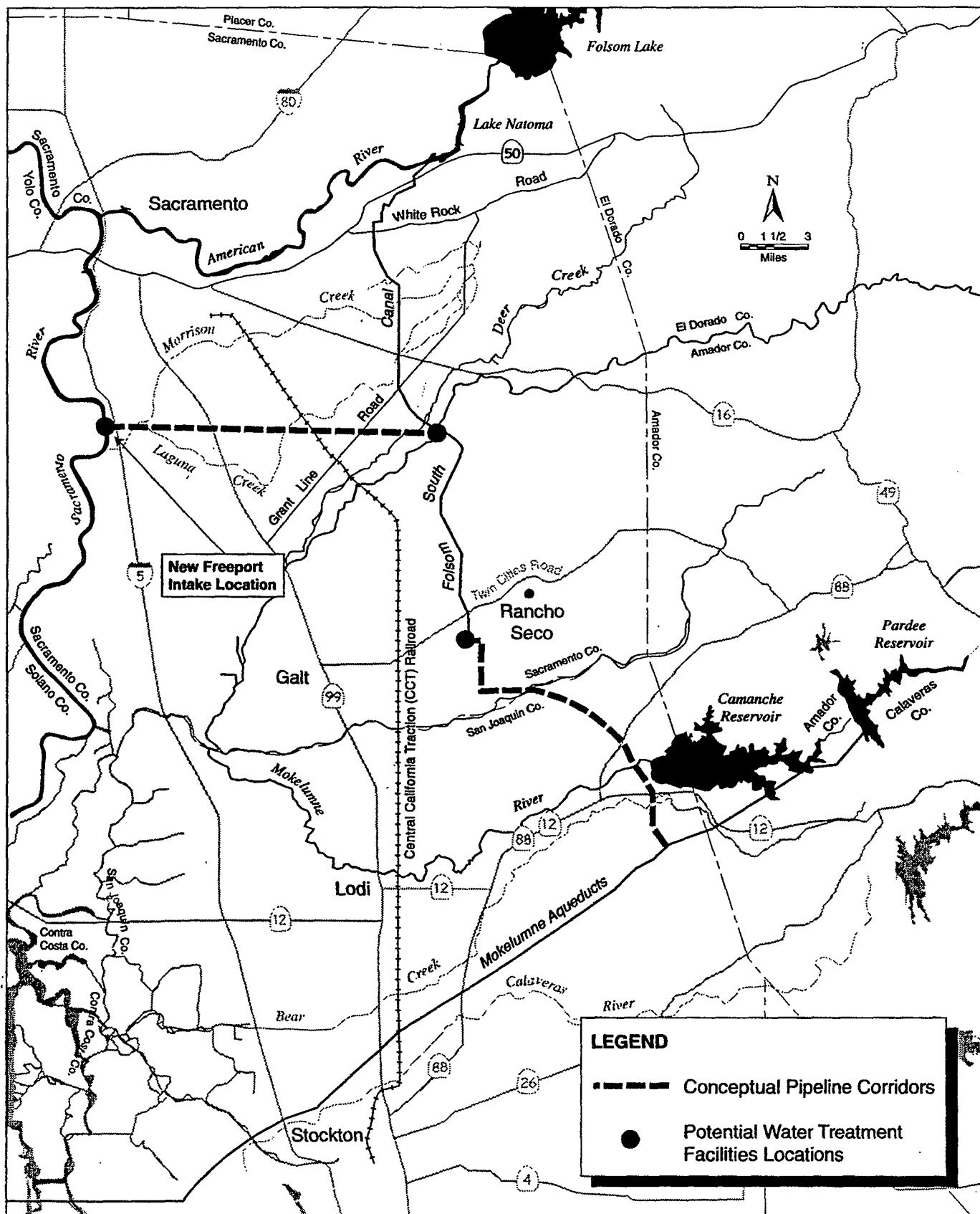
To ensure adequate treatment of water from this source before its delivery to EBMUD customers, and to comply with applicable state water quality requirements, it is anticipated that this alternative would also require expansion of EBMUD's existing in-line water treatment facilities. Expansion would include new flocculation facilities, solids management, and other improvements made within the existing grounds of the Walnut Creek, Lafayette, and Orinda WTPs in the EBMUD service area.

During a planned outage of EBMUD's Mokelumne River facilities, such as for major maintenance or seismic improvements, EBMUD would also use a portion of the intake capacity at the Fairbairn WTP, in addition to the new intake upstream of the I-5 bridge, to meet its water supply needs. This planned outage scenario is anticipated to occur infrequently and

total no more than 12 months in a 20-year period, with a maximum continuous outage period of 6 months.

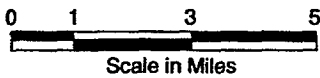
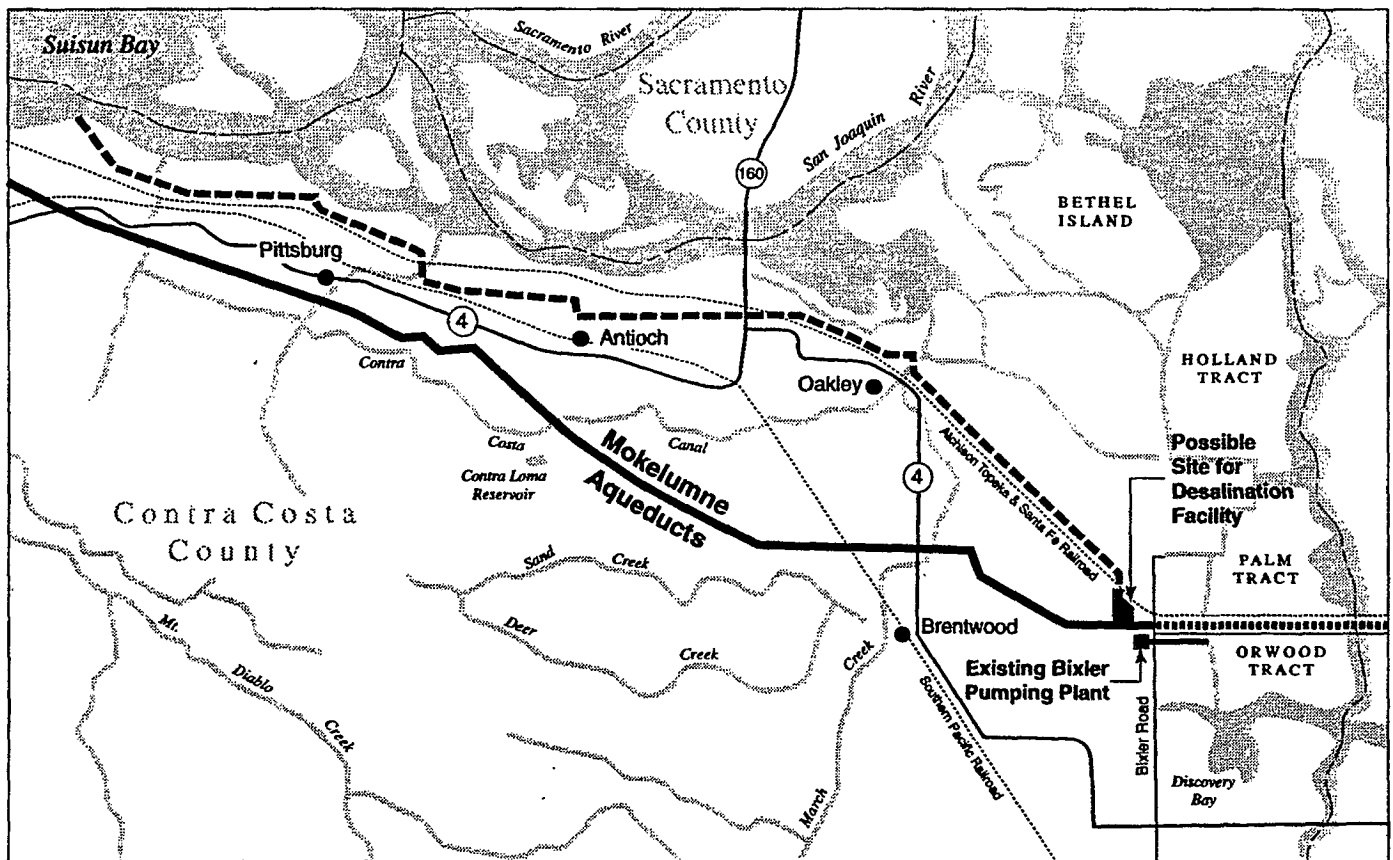
Joint Project with the City of Sacramento and the County of Sacramento - Fairbairn WTP Intake Only

A joint project alternative with a delivery of American River water at the Fairbairn WTP is depicted in Figure 3-7. This alternative is similar to the joint project described above, except that no new intake facility would be constructed further downstream. Under this alternative, EBMUD and the County would take delivery of water at the existing City intake structure at the Fairbairn WTP. The City would also increase its diversion capacity at the Fairbairn WTP in response to projected increases in demand within its service area. The County supplies would receive treatment at the Fairbairn WTP, along with City water, and then be directed into a new buried pipeline for conveyance to the FSC and subsequently to the Mokelumne Aqueducts via a new buried pipeline along Pipeline Alignment 2 (described above). The County supply would be directed into a separate pipeline and conveyed generally south for use within the County's service area. This alternative would require expansion of the existing Fairbairn WTP intake structure and treatment facilities to accommodate the new County supplies and the City's increased diversion. Under this scenario, EBMUD would also improve its existing service area treatment facilities, as previously described for the EBMUD-only American River Delivery alternatives. Planned outage water supply needs would be taken at the Fairbairn WTP.



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Figure 3-4
Conceptual EBMUD-Only
Sacramento River at Freeport



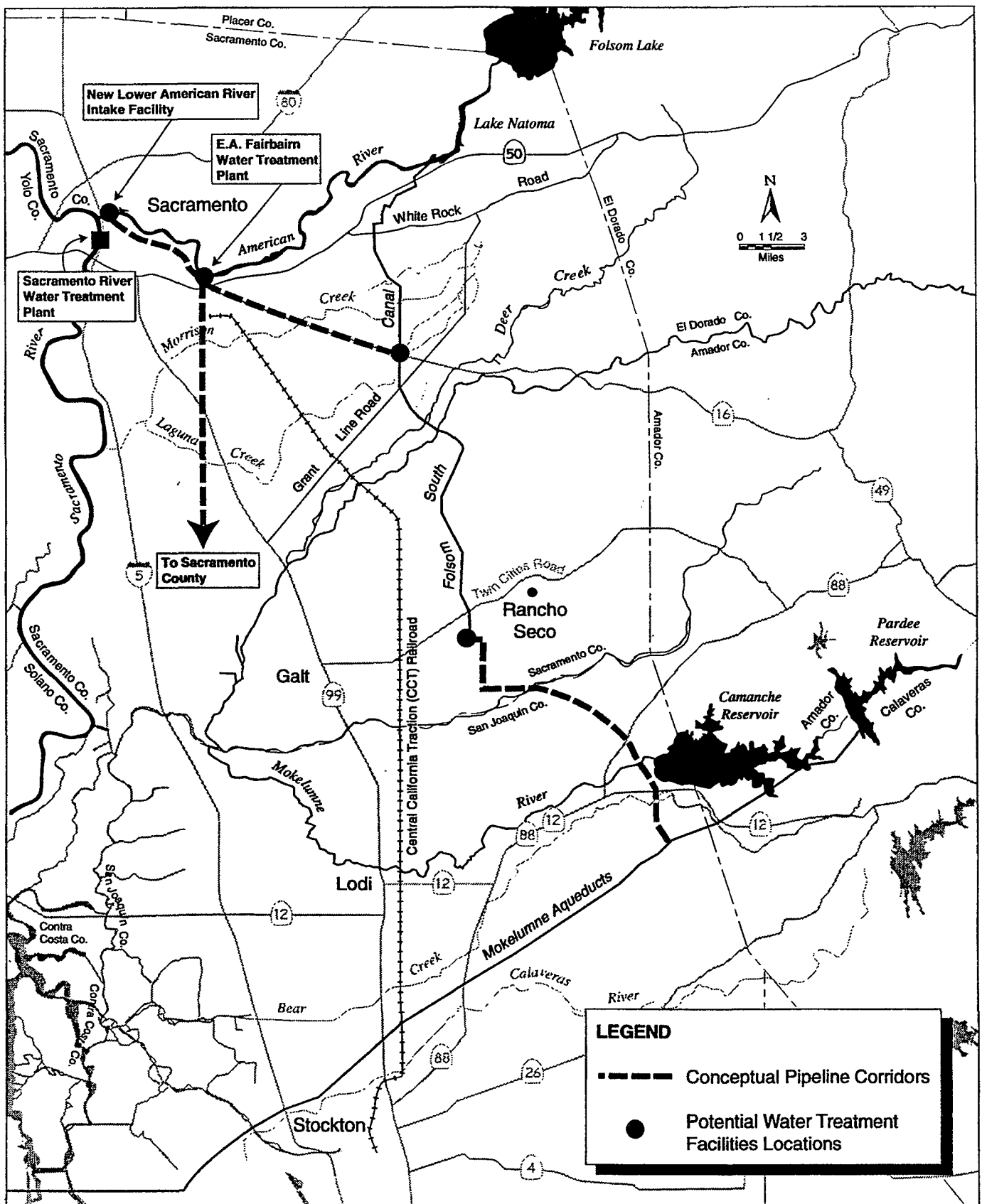
Legend

- Aboveground Section of Mokelumne Aqueducts
- Buried Section of Mokelumne Aqueducts
- - - - - Possible Location for Brine Disposal Pipeline



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Figure 3-5
Delta Delivery



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Figure 3-6
Conceptual Joint Project Alternative with the
City of Sacramento and the County of Sacramento

Joint Project with the City of Sacramento and the County of Sacramento - Sacramento River Water Treatment Plant Delivery

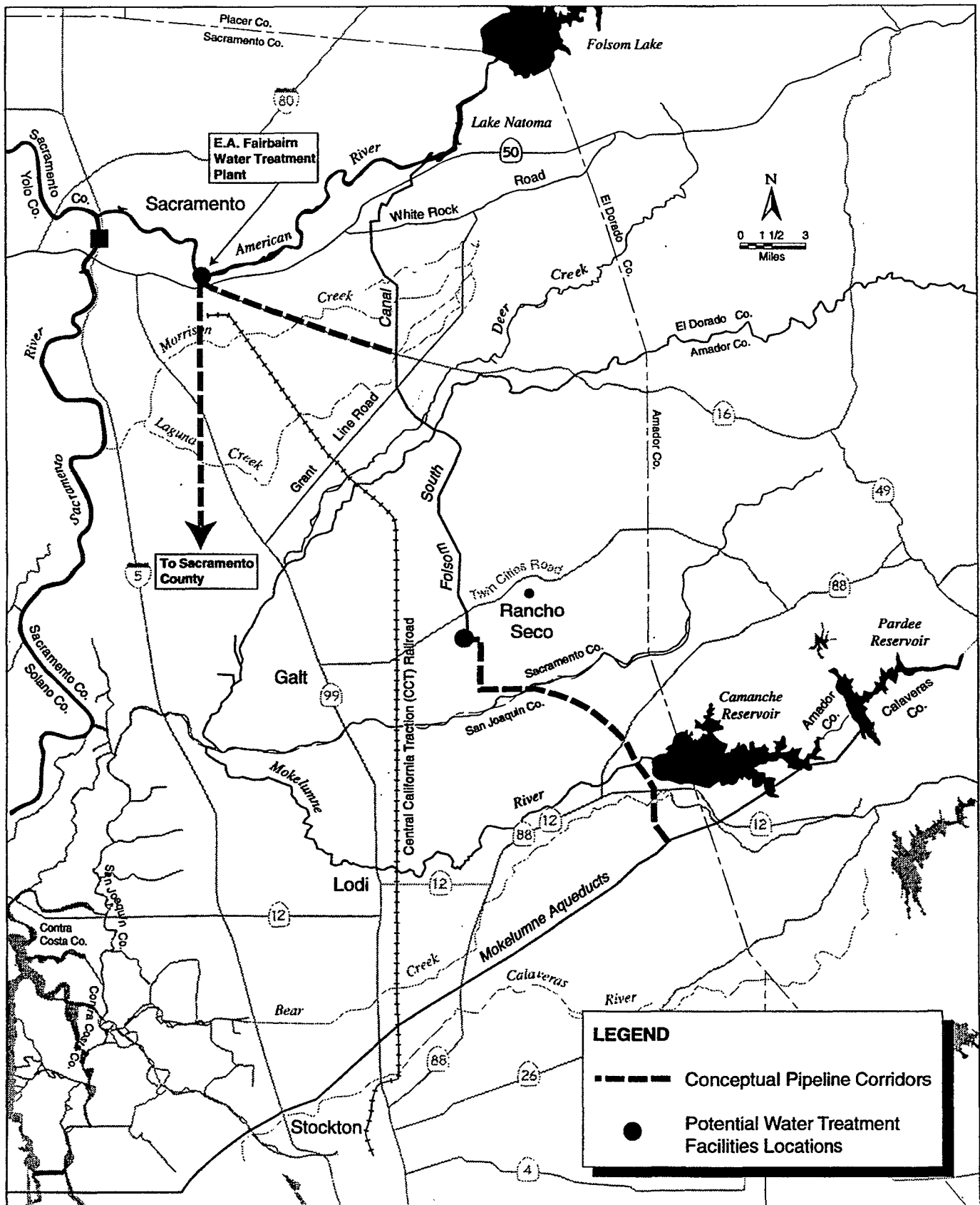
Another potential joint project alternative would involve use of Sacramento River water by EBMUD, the City, and the County at the Sacramento River WTP (Figure 3-8). The intake structure at this location would be expanded. The EBMUD supply would be treated at a new facility with a membrane filtration pretreatment process followed by reverse osmosis, similar to the EBMUD-only alternatives involving use of water from the Sacramento River or Delta. New pipelines would be constructed to convey EBMUD water to the FSC and to the Mokelumne Aqueducts via a new buried pipeline along Pipeline Alignment 2 (described above). The County supply would be treated at the existing plant or at a new facility and directed into a separate pipeline and conveyed generally south for use within the County's service area. EBMUD's planned outage water supply needs would be met by taking water at both the Sacramento River WTP and FSC.

EBMUD/CALFED Combined Facility

CALFED is a consortium of state and federal agencies currently involved in a multi-phased program aimed at achieving improvements to the ecosystem, water quality, water supply reliability, and system vulnerability problems in the Sacramento/San Joaquin Delta. CALFED is considering a project, as part of its Dual Delta Conveyance alternative, to construct an isolated transfer facility on the Sacramento River near the towns of Hood or Freeport to interconnect with and convey water to existing Central Valley Project (CVP) and State Water Project (SWP) facilities in the southern Delta. With an EBMUD/CALFED combined alternative, EBMUD would also use this system to take delivery of its

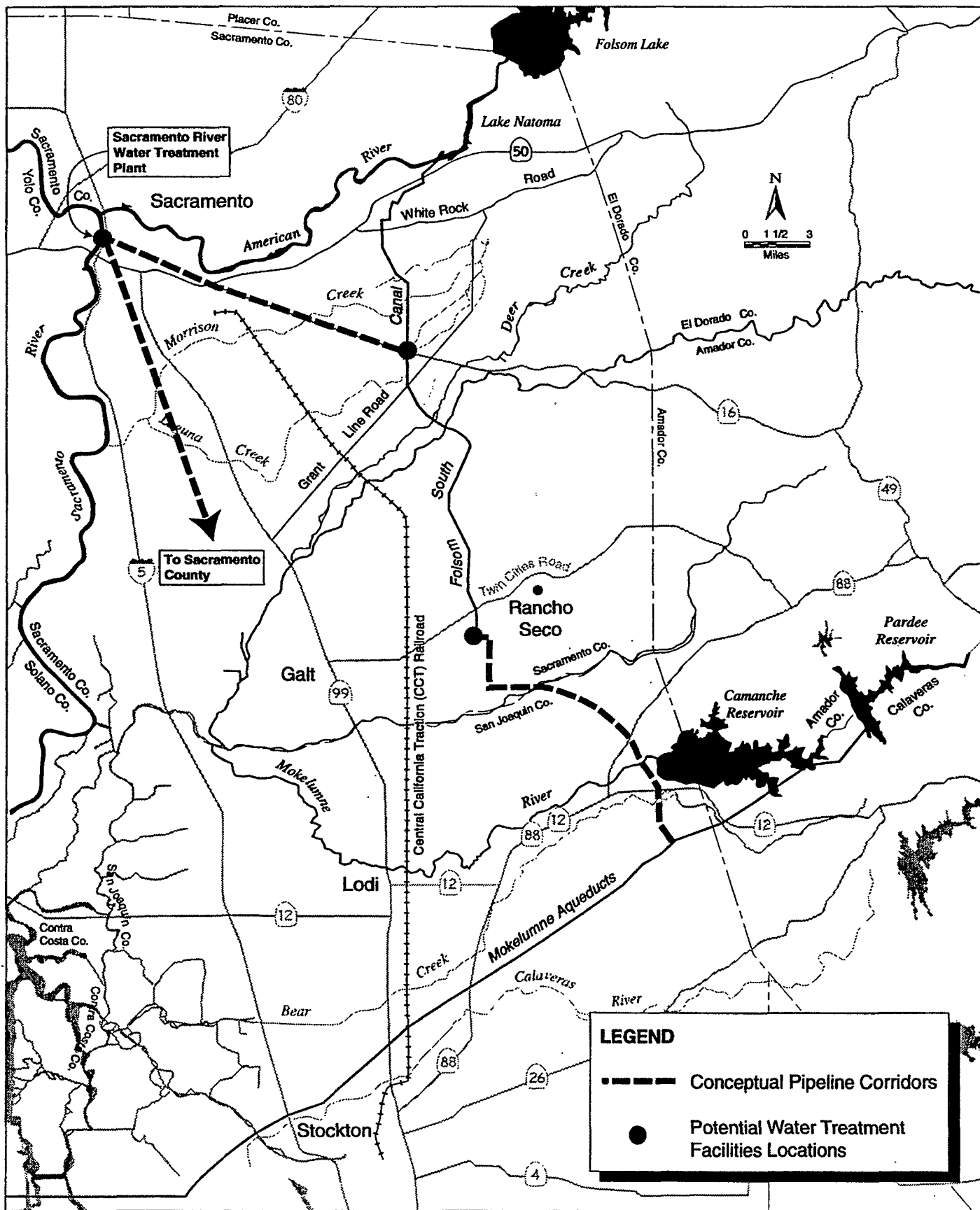
American River allocation. Conceptually, EBMUD would take delivery of its supply through a connection with the potential CALFED pipeline in the southern Delta. Because the CALFED program is in the early stages of the planning process, the alternative can only be conceptually described at this time.

As with the previously described EBMUD-only alternatives involving taking delivery of Sacramento River water, water quality conditions on the Sacramento River would require construction of a new water treatment facility, including a membrane filtration pretreatment process followed by reverse osmosis, similar to the Delta delivery alternative described earlier.



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Figure 3-7
Conceptual Joint Project Alternative with the
City of Sacramento and the County of Sacramento
Delivery at Fairbairn Only



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Figure 3-8
Conceptual Joint Project Alternative with the City of
Sacramento and the County of Sacramento with Intake
at Sacramento River Water Treatment Plant

Chapter 4. Alternatives Screening Criteria

This chapter provides the supporting information used to develop the screening criteria used to evaluate each alternative's ability to meet EBMUD's FSCC project objectives. The screening criteria provide a measure of whether a project alternative will satisfy the basic project purpose and a method to determine if alternatives are available and practicable. Some of the criteria correspond directly with the project objectives identified in Chapter 2; others reflect issues that should be considered in identifying practicable alternatives. Throughout the remainder of this chapter, screening criteria are indicated at the beginning of each section, followed by the supporting information.

USE OF EXISTING RECLAMATION CONTRACT FOR AMERICAN RIVER WATER

Criterion: *An alternative must allow EBMUD to take delivery of its contracted maximum 150,000 AF per year of American River water consistent with the Hodge Decision.*

EBMUD's existing American River water service contract with Reclamation and the Hodge Decision conditions that apply to EBMUD's ability to make use of its contracted water are described in Chapter 2. Together, the existing contract and the Hodge Decision allow EBMUD to take delivery of up to 150,000 AF of water from the American River annually, when established, minimum instream flows are maintained on the lower American River (Hodge Decision 1990).

Chapter 2 explains that the Updated WSMP identified five major water supply project components to assist EBMUD in satisfying its water supply objectives. These included measures to strengthen facilities; conserve, reclaim, and reuse wastewater; better manage

Mokelumne River fisheries; and implement a supplemental water supply project.

To meet the first screening criterion and satisfy the first project objective, a project must allow EBMUD to make use of its Reclamation contract for American River water consistent with the Hodge Decision. It is assumed for the purposes of this analysis that alternatives involving the delivery of water from the lower American River upstream of the Interstate 5 bridge crossing would not require compliance with the Hodge Decision's flow criteria; however, this assumption would need to be confirmed with a ruling by the Court.

WATER QUALITY

Criterion: *An alternative must allow EBMUD to maintain the high quality of both its raw and treated water supply while minimizing health risks and health risk uncertainties for EBMUD customers, consistent with state and federal law and EBMUD's Policy 81.*

EBMUD's water supply evolved on the need to seek, secure, and protect high-quality sources of water. Over 70 years ago, EBMUD secured a very high-quality water supply source from the Mokelumne River, despite the availability of less expensive sources of supply. Aggressive watershed management practices have been implemented to preserve this high-quality source. While drinking water regulatory standards have become increasingly stringent, key water quality parameters in water EBMUD delivers to its customers are measured well below their health-based limits (see Appendix A). In evaluating numerous alternatives for a supplemental water supply source for the Updated WSMP and during the course of citizen advisory committee meetings, EBMUD ratepayers communicated the need for the EBMUD Board of Directors to establish

water quality objectives that "maintain the high quality of the District's water supply." (Vol. 1, pp. 6-4 in EDAW 1993).

To meet the water quality criterion, an alternative must provide a water supply of sufficiently high quality to be consistent with EBMUD's Policy 81 (East Bay Municipal Utility District 1997) and state law, which calls for obtaining its water supply from the highest quality source available to minimize treatment uncertainties and potential related health risks to customers. Policy 81 is summarized on the following page.

Policy 81 is consistent with the American Water Works Association policy statement that "[w]here...alternative sources of water are available for public drinking water supply, water should be taken from the highest-quality source" (pp. 14-15 in California State Water Resources Control Board 1988a). It is also consistent with the Hodge Decision. The court found that "[f]rom the evidence provided...the health risk concerns of EBMUD [regarding water quality] are well-founded" (p. 72 in Hodge Decision 1990). The court acknowledged that although scientific evidence of the actual types and degree of health risks associated with certain water quality conditions is often lacking or uncertain, priority should be given to utilizing water from the highest quality source to minimize uncertainties and overall health risks. Specifically, the court stated that:

establishment of "slight" or "moderate" [health] risks with respect to certain pollutants assumes a higher level of significance given the substantial unknown factors which have...been demonstrated. Developing chemical technologies continue to increase the pollutant load on the waterways, while the technology of effective detection has not kept pace. Further, it [is] entirely likely that the existence of deadly carcinogens may first be conclusively determined only through epidemiological studies which are successful in charting patterns of illness

only after substantial illness has occurred throughout the population....[T]he essence of East Bay MUD's position in this case is the importance of drinking water of the highest quality and not merely the convenient availability of the water. [p. 73 in Hodge Decision 1990.]

SWRCB, as referee in the case, also supported EBMUD's preference for the highest quality water supply in acknowledging that "[p]rudence required that public water suppliers should minimize treatment uncertainties by seeking water from the best available source and as removed from the potential for degradation as possible" (pp. 14, 15 in California State Water Resources Control Board 1988a).

To be consistent with these *EDF et al. v. EBMUD* conclusions and EBMUD's Policy 81, an alternative must allow EBMUD to maintain the high quality of both its raw and treated water supply while reducing uncertainties regarding health risks to its customers. First, the water from the source under consideration must be capable of being adequately treated within a reasonable cost range so that blending of the new water with EBMUD's existing supply, which is of very high quality, would not be degraded. (EBMUD's current water supply source, its water treatment system, and the quality of its raw and treated water supply in relation to state and federal water quality standards are described in Attachment A.)

Additionally, available data must provide strong evidence that health risks associated with a water supply source are minimized or avoided, and uncertainties regarding the actual degree of these health risk must be small.

An alternative must also be consistent with all applicable state and federal laws regarding water quality. A summary of state and federal water quality regulations is provided in Attachment A.

EBMUD Policy 81**Source Water Quality**

It is the policy of the East Bay Municipal Utility District to:

Protect the public health of its customers by serving high quality water from the best available source in preference to reliance on additional treatment.

Best Available Source

Consistent with the California Safe Drinking Water Act of 1996, EBMUD will take actions to minimize public health risks by protecting existing high-quality water sources and seeking the highest quality source water reasonably available for supplemental supplies.

Consistent with EBMUD's statutory obligations and responsibilities to its customers, highest priority shall be given to protecting the quality of drinking water supplies, compatible with protection of public trust resources.

Consistent with the Alameda County Superior Court decision affirming EBMUD's American river contract (Alameda County Action No. 425955), providing high quality drinking water is a significant public policy that is furthered by diversion from the best available source.

Meeting Drinking Water Standards

Supplying water from the highest quality source water available is the safest and most prudent way to enable EBMUD to meet current and future state and federal health-based drinking water quality standards.

Given current and future increasingly stringent drinking water standards, EBMUD will minimize public health risks by seeking the best available water source, protected from potential degradation, thereby reducing the uncertainty of technology's ability to eliminate health risks and the potential for added risks from treatment byproducts.

Authority: Resolution 3039-97, dated April 22, 1997.

Source: East Bay Municipal Utility District 1997.

WATER SUPPLY RELIABILITY

Criterion: *An alternative must increase system reliability by providing a reliable alternate source of supply to EBMUD's Mokelumne River supply in the case of a catastrophic event or scheduled major maintenance at Pardee Reservoir.*

As discussed in Chapter 2, a supplemental supply independent of the Pardee Reservoir system is needed to ensure water supply reliability during scheduled and unscheduled facility outages at Pardee Reservoir. Under current conditions, EBMUD relies on diversion of Mokelumne River water at Pardee Reservoir for approximately 95% of its total water supply. In the event of a catastrophic failure, emergency shutdown, or during scheduled maintenance or repair of Pardee facilities, EBMUD must currently rely on storage within the five existing terminal reservoirs in its service area to meet its entire customer demand.

Potential emergency scenarios capable of substantially interfering with EBMUD's ability to divert Mokelumne River water at Pardee Reservoir include:

- structural damage to Pardee Dam,
- a hazardous spill in or upstream of Pardee Reservoir or degradation of water quality resulting from a major flood,
- an extended drought resulting in temporary reductions in the amount of EBMUD's available water supply, or
- general failure of EBMUD's intake or conveyance facilities at Pardee Reservoir.

For an alternative to meet the first water supply reliability criterion, it must be capable of providing a backup water supply to supplement EBMUD's currently limited emergency and drought storage supplies. Potential emergency

scenarios and other conditions that could result in a temporary Pardee outage are discussed in greater detail below.

Structural Damage to Pardee Dam

Pardee Reservoir was created with construction of Pardee Dam in 1929 (Figure 3-4). The dam is a concrete gravity-arch structure rising approximately 345 feet above the bed of the Mokelumne River. The dam detains a maximum of 198,000 AF of water in the reservoir at the spillway crest, which has an elevation of approximately 568 feet above the riverbed. Pardee Reservoir is used by EBMUD for hydroelectric power generation and, in combination with Camanche Reservoir downstream, for flood protection of the lower Mokelumne River area under an agreement with the Corps. EBMUD diverts its Mokelumne River supply from Pardee Reservoir through the Pardee Tunnel into its three Mokelumne Aqueduct pipelines.

Because EBMUD lacks an alternative water supply to serve its customers during an extended Pardee facility outage, Pardee Dam has never been taken out of service for lengthy repairs or upgrades. A large seismic event, major flood upstream, or other catastrophic event, however unlikely or rare, could structurally weaken the dam's foundation. This could result in an immediate need to cease operation of Pardee facilities while emergency repairs were implemented.

Contamination or Water Quality Degradation

The transport of oil and other potentially hazardous chemicals through transportation corridors upstream and near Pardee Reservoir exposes EBMUD's water supply to potential contamination from accidental spills. Areas of high risk for such spills include roads that are near or that cross the river or reservoir. Some

primary roads in the vicinity of Pardee Reservoir are shown in Figure 4-1.

Except for transport of hazardous waste, certain explosives, and radioactive materials, the movement of goods by truck is essentially unregulated, and no quantitative information on volumes, types of materials, or frequency of shipments is available. Spills resulting from accidents on state and federal highways are monitored by the California Highway Patrol, California Department of Transportation, the Office of Emergency Services, and the Central Valley Regional Water Quality Control Board. Generally, the size and location of a spill determines which agencies are involved in monitoring the cleanup activities.

The effect of a hazardous release on EBMUD's Mokelumne River water supply would depend on the material released and the magnitude and location of the accident or leak. In a major chemical spill, an acute water supply shortage could result because EBMUD's current water treatment process would be insufficient to reduce toxin concentrations to safe levels. Cleanup time could be substantial, and water quality could remain lowered for an extended period following basic cleanup.

Substantial degradation of water quality within Pardee Reservoir can also occur as a result of increased turbidity during and following a major flood. Because EBMUD's existing treatment system is designed to treat very-high-quality water, its ability to treat water with substantially higher turbidity levels is limited. For this reason, the Mokelumne River supply may be temporarily unavailable for use in a major flood.

Extended Drought

As discussed in Chapter 2, for the Updated WSMP, an assumed 3-year drought was used in estimating EBMUD's needed drought supply. Factors influencing EBMUD's need for water during a severe drought include the capacity of

its existing storage system (including Camanche and Pardee reservoirs); the FERC proceeding, which will include determination of a flow regime for the lower Mokelumne River and may place additional limitations on the Mokelumne River water available to EBMUD during droughts; and potential influences of the Bay-Delta proceedings, an expected decision by SWRCB on the Mokelumne River hearings, and full implementation of the Central Valley Project Improvement Act (CVPIA). The proposed settlement in the FERC proceeding would result in an EBMUD need for water of approximately 185,000 AF over the 3-year drought scenario, with up to 20,000 AF contingent on future yield increases from WSMP-related projects. This need may increase in the future under the influence of the factors listed above.

General Failure of Intake or Conveyance Facilities at EBMUD Diversion

As described in Chapter 2, EBMUD diverts its Mokelumne River supply at Pardee Reservoir. Water is diverted through the EBMUD intake structure into Pardee Tunnel, which conveys water to the Campo Seco facility. From the Campo Seco facility, water is directed into the Mokelumne Aqueducts and conveyed to the EBMUD service area.

EBMUD makes regular efforts to inspect and maintain its Pardee facilities. However, the potential for a general failure of one or more system components cannot be ruled out. Any such disruption in Pardee operations could render EBMUD's Mokelumne River supply temporarily unavailable. The duration of an unplanned system shutdown would depend on the severity of the outage or failure and, in the case of a general failure, the degree of difficulty of access to affected system components, the season (e.g., poor weather conditions could slow repairs), the availability of replacement parts, and other similar factors. As with other system shutdown emergencies, EBMUD's Mokelumne

River water supply would be temporarily interrupted and customers would be supplied with existing emergency storage supplies from the terminal reservoirs.

Planned Outage

Pardee facilities will likely need to be shut down in coming years for general upgrading or maintenance. As discussed in Chapter 2, EBMUD customer demand and projected need for water are expected to increase during the next 20-year planning period. With its projected water demands and potential Mokelumne River supply limitations under consideration, EBMUD anticipates the need for a supplemental water supply capable of meeting full customer demand (assuming no water is available from other sources) for a total of 6-months, the longest continuous outage expected as part of EBMUD's anticipated total 12 months of planned outage that will be required over the next 20 years. This will need to be accomplished while minimizing impacts on EBMUD's terminal reservoir storage.

Criterion: *An alternative must provide increased operational flexibility and reduce customer deficiencies.*

As described in Chapter 2, EBMUD currently relies on diversion of Mokelumne River water from Pardee Reservoir for approximately 95% of its total water supply. Although EBMUD has a maximum Mokelumne River entitlement of 325 MGD, the availability of this supply is limited by river hydrology and a variety of downstream flow obligations, including releases for fishery needs, flood control, and other senior rights holders. Further limitations on the availability of the Mokelumne River supply are expected in the future; concurrently, many factors will likely increase EBMUD's need for water in the future (see Chapter 2).

Many factors will affect limitations on Mokelumne River supplies, for instance, will

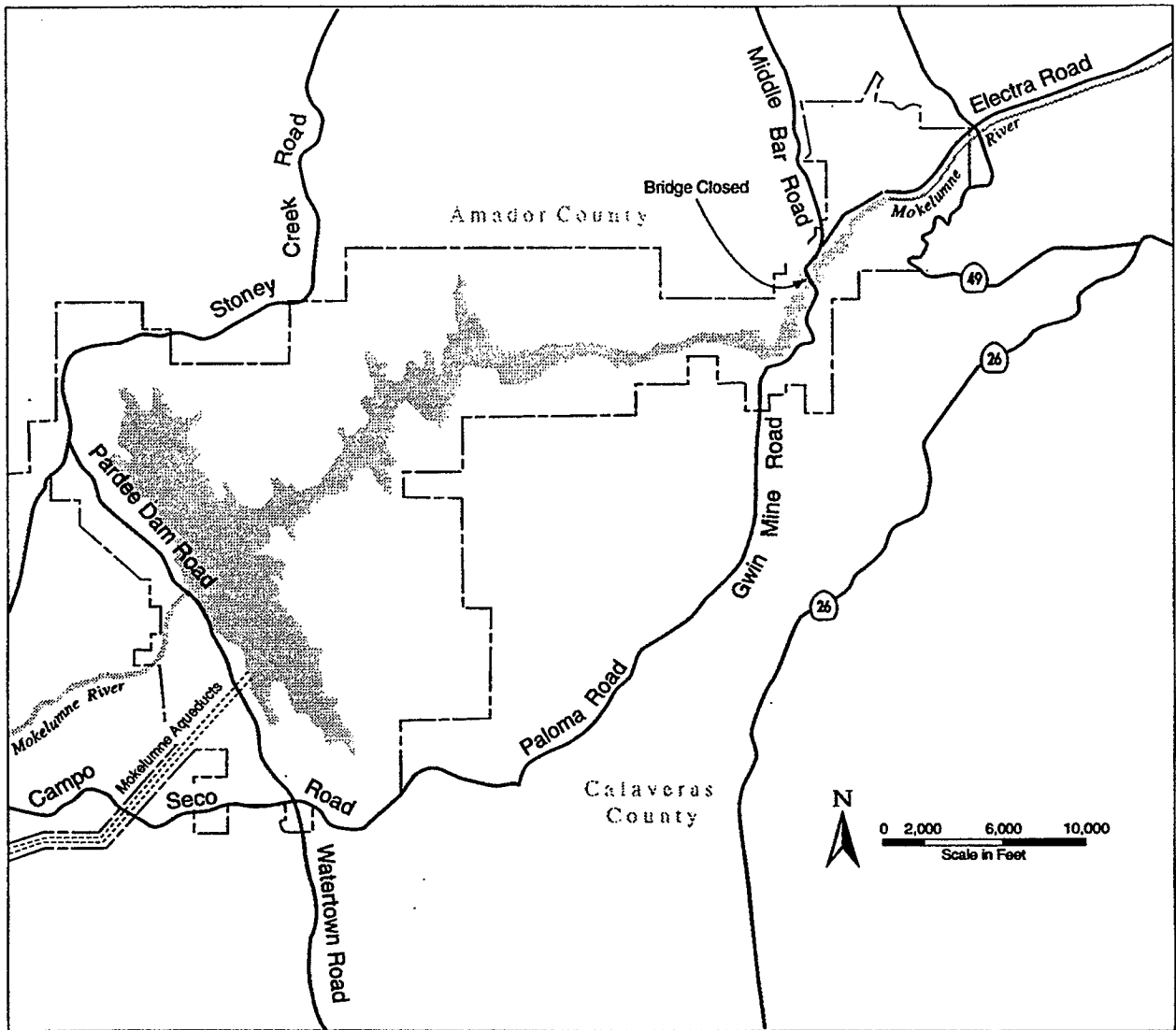
reduce the Pardee system contribution to meeting EBMUD's need for water, necessitating use of an additional water supply source or sources to compensate for the reductions. However, the availability of alternative supplies will also likely be limited, generally and/or at specified times of the year (for example, for flow regulation to accommodate seasonal fish runs).

Operational flexibility could be increased by utilizing a water supply source that is not dependent on the Pardee system and could be further increased by utilizing a supply completely independent of the Mokelumne River. Additionally, because the availability of any one water supply source will be limited to some degree, an alternative should provide system redundancy and avoid reliance on any one water supply source. This flexibility would allow EBMUD to vary its use of differing sources in response to the limitations on supplies, to accommodate temporary facility outages, and to increase options for drought planning, including better management of reservoir storage. This in turn will result in reduced customer deficiencies both generally and during extended droughts.

ENVIRONMENTAL AND BIOLOGICAL CRITERIA

Criterion: *An alternative must increase opportunities for protection and enhancement of Mokelumne River resources.*

For an alternative to meet this criterion, it must improve EBMUD's ability to maintain sufficient instream flows in the lower Mokelumne River to protect and enhance fisheries and other environmental resources. Identification of an alternate water supply source to supplement EBMUD's current supply should allow for such increased operational flexibility; however, based on potential limitations in availability of water from various sources, some alternatives may allow for more



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Figure 4-1
Major Roadways In Vicinity
of Pardee Reservoir

opportunities for protection and enhancement of Mokelumne River resources than others. The screening evaluation should consider the degree to which each alternative would contribute to meeting this criterion.

Criterion: *An alternative must not result in unacceptable environmental impacts.*

State and federal environmental regulations require disclosure of any major unacceptable environmental impacts associated with each feasible project alternative. As discussed in Chapter 1, Section 404(b)(1) Guidelines require that an applicant for an individual Section 404 permit ensure that the least environmentally damaging, practicable alternative is used to meet the basic project purpose. Certain alternatives may have significant environmental impacts that render them impracticable. In some cases, an alternative will have much greater environmental impacts than other practicable alternatives. In that case, the alternative with major impacts cannot be considered the least environmentally damaging, practicable alternative that meets the basic project purpose.

For an alternative to meet this criterion, it must not be anticipated to result in major environmental impacts which have previously been identified as unacceptable (for example, during a previous review process), and/or would render the alternative either unpracticable or substantially inferior to other feasible alternatives.

CONSISTENCY WITH UPDATED WSMP PLANNING OBJECTIVES

Criterion: *An alternative must contribute to achieving EBMUD's planning objectives established as part of the Updated WSMP.*

As presented in Chapter 2, the Updated WSMP planning objectives are:

- Provide adequate capacity, flexibility, and reliability to respond to the problems and challenges of maintaining the EBMUD water supply.
- Minimize total direct costs to EBMUD customers.
- Maintain the high quality of the water supply. This includes taking steps to ensure that EBMUD's potable water will meet all existing and anticipated drinking water standards and that EBMUD's nonpotable water is of quality suitable to its use.
- Protect and improve the biological resources that could be affected by existing EBMUD facilities and the Supplemental Water Supply Project).
- Maintain outdoor recreation opportunities.
- Minimize risks to public health and safety.
- Minimize adverse sociocultural impacts.

For EBMUD to continue to work toward achievement of the Updated WSMP objectives, an alternative must contribute to meeting these planning goals.

TECHNICAL AND OPERATIONAL CRITERIA

Criterion: *An alternative must not have any significant geotechnical or engineering problems, questionable or untested technology, or unreliability of site or resources.*

Existing technology must be adequate to ensure that EBMUD's basic project purpose and project objectives can be reasonably met. Reliance on any questionable or untested technology would expose EBMUD to substantial risk in achieving the basic project purpose. Because meeting water quality and reliability objectives will be costly with any practicable alternative, EBMUD should not risk implementation of an alternative that could fail to meet the basic project purpose based solely on unsound, untested, or questionable technology or unreliability of the proposed project site or resources. Unreliable availability of site or resources would include potential sites that are unavailable or inaccessible to EBMUD for locating project facilities, or water supplies that are not practicable. In addition, some alternatives may rely on technology so advanced that the alternative would not be cost effective. These alternatives would also fail to meet the technical and operational criterion.

JURISDICTIONAL CRITERIA

Criterion: *An alternative must not require any permits that cannot be reasonably obtained given consideration of cost, logistics, or existing technology.*

Necessary permits and agreements must be foreseeably obtainable from public agencies. An alternative cannot be deemed practicable if necessary permits or agreements cannot be obtained or if permit acquisition or agreement finalization is so costly or time consuming that

the basic project purpose cannot be reasonably met. Potential political opposition or litigation over permit issuance, however, does not necessarily eliminate an alternative from consideration.

Criterion: *An alternative must not require infeasible approvals, agreements, or coordination between EBMUD and other agencies or jurisdictions.*

Any alternative requiring joint participation between EBMUD and one or more other agencies or jurisdictions could require detailed agreements and intensive coordination among project participants. Some alternatives could also require special approvals or revision, amendment, or reconsideration of a current contract, agreement, or previous court decision. For an alternative to meet the second jurisdictional criterion, it must not imply any such requirements that would likely be infeasible based on a history of unproductive negotiation efforts, potential conflicts of interest, general inability of one party or more parties to fulfill proposed agreements, or similar reasonable indications of jurisdictional infeasibility.

TIMING CRITERIA

Criterion: *An alternative must be capable of being feasibly implemented by 2001.*

Through continued assessment of customer needs and planning for the Supplemental Water Supply Project, EBMUD has identified the end of 2000 as a reasonable preferred deadline for implementation of the proposed project. An alternative that could not feasibly implemented by 2001 would fail to meet this criterion.

ECONOMIC CRITERIA

Criterion: *An alternative must be of reasonable cost while meeting most of the project objectives.*

The project economic criteria focus on identifying the project alternative that would best satisfy the project objectives at the most reasonable cost. For the economic analysis, alternatives were first considered for their ability to meet the project objectives, which have been incorporated into the other screening criteria. The alternatives that were not precluded from further analysis based on failure to meet other screening criteria were then compared by their estimated costs.

Criterion: *An alternative must minimize costs to rate payers.*

Minimized capital, operational, and maintenance costs would minimize costs to rate payers. An alternative should minimize costs to the extent feasible while also meeting most project objectives.

Chapter 5. Evaluation of Alternatives

INTRODUCTION

The results of the alternatives screening evaluation are presented in Table 5-1. For an alternative to be considered feasible, it must reasonably be capable of meeting the defined screening criteria. If an alternative could clearly be shown to be incapable of meeting one or more of the screening criteria, the alternative was eliminated from further consideration without a detailed evaluation of its ability to meet the remaining criteria.

ALTERNATIVE EVALUATION SUMMARIES

EBMUD-Only Alternatives

American River Delivery through the Folsom South Canal

As discussed in Attachment A to this report, water quality diverted at Nimbus Dam into the Folsom South Canal is of only slightly lower quality than the water currently diverted from Pardee Reservoir. After considering water quality information for Nimbus Dam, the Sacramento River, and the Delta, the Hodge Decision concluded that "water quality for municipal purposes is appreciably superior when drawn directly from the reservoir at the Folsom-South Canal" (p. 74 in Hodge Decision 1990). In concluding its water quality investigation comparing the three sources as evidence in the case, the SWRCB stated the following:

[I]t is reasonable and prudent for EBMUD to seek its municipal water supply from the American River. In the absence of conclusive data [regarding water quality and potential health risks at other sources], we believe it is better to err in the direction that will afford maximum protection to the public health. The American River has the

best water quality, would require the least treatment, and would pose the lowest public health risk of the alternative sources. (California State Water Resources Control Board 1988b.)

The high quality of water from Nimbus Dam would greatly minimize the potential for degradation of EBMUD's existing supplies and would minimize health risks and health risk uncertainties for customers. It would therefore meet the water quality criterion.

The FSC alternative would be more limited in its ability to meet EBMUD's need for water than some other alternatives because of Hodge Decision flow restrictions, especially during dry periods. This alternative would provide a supplemental water supply not dependent on the availability of the Mokelumne River supply or Pardee Reservoir operations. The ability to increase EBMUD's operational flexibility and enhance supply reliability is enough to meet the supply reliability criteria, although other alternatives not subject to the Hodge flow conditions may enhance reliability even more.

The ability of each pipeline alignment and the open canal alignment alternative to meet other screening criteria is addressed below.

Pipeline Alignments 1 and 4. The jurisdictional feasibility of abandonment and reuse of the CCT rail line right-of-way, as required for Pipeline Alignments 1 and 3, is presently uncertain. As described in Chapter 3, up to 25 miles of this line may be used for construction of the FSCC pipeline. The CCT is currently in use and has recently expanded its freight service route to include new customers in the City of Lodi. Other current and planned uses of the CCT may be limited or discontinued if the rail line is abandoned. Federal regulations require approval of any rail line abandonment by the Surface Transportation Board.

All other screening criteria could be met, based on available information.

Pipeline Alignments 1 and 3 also will be evaluated in the EIR/EIS.

Pipeline Alignments 2 and 3. Pipeline Alignments 2 and 3 would require modification of EBMUD's existing American River water service contract for a change in delivery location. Pipeline Alignments 1 and 4 are based on the contract point of delivery and would not necessarily require a contract modification. All other screening criteria could be met, based on available information.

Pipeline Alignments 1, 2, 3 and 4 will be evaluated further in the EIR/EIS.

Open Canal. Construction of an open canal connection would be less costly than construction of a buried pipeline (see cost comparison in Table 5-1). However, the operation and maintenance associated with an open canal would be greater as a result of required security operations, debris removal, increased maintenance and repair difficulties, and similar requirements. This increase in long-term costs reduces this alternative's apparent economic benefit over a buried pipeline. Additionally, the potential liability risks associated with public health and safety issues with a canal (such as risk of accidental injury or drownings) could result in greater costs over the long term which could be avoided with use of a buried pipeline.

A canal would also result in overall lower water quality associated with water stagnation, increase potential for organic or chemical contamination from nearby agricultural operations, and an incrementally increased risk of contamination from accidental spills from vehicles at road crossings. Because of the potential for increased health risk uncertainties for EBMUD customers, even after treatment with existing water treatment technologies, it is

uncertain whether this alternative would adequately meet the water quality criterion.

This alternative is also expected to result in substantially increased environmental impacts including:

- incompatibility with surrounding agricultural and urban uses;
- potential for greater property severance issues than for buried pipelines because of siting constraints;
- decreased public safety, including potential injury or drowning;
- potential flooding of nearby property in case of malfunction or leak;
- restricted movement of wildlife;
- changes in the visual environment; and
- decreased water quality and increased potential contamination resulting from an additional 15-mile conveyance in an open canal.

Because many of these effects could be significant and could be avoided or substantially reduced with implementation of the pipeline alternatives under consideration in this report, the open canal alternative would fail to meet the environmental and biological criteria.

All other screening criteria could be met, based on available information.

Inability to meet the environmental and biological criteria, combined with a lack of any significant advantages over a buried pipeline alternative, preclude this alternative from further consideration for the Supplemental Water Supply Project.

American River Delivery - Intake Upstream of I-5 Bridge

This alternative would also meet the water supply reliability criteria. Because the intake facilities would be located downstream of the most environmentally sensitive portion of the American River for fisheries and recreation, the Hodge flow restrictions may not apply to this alternative. According to this assumption, direct water supply availability during dry years would be greater than with an FSC diversion. This alternative would require modification of EBMUD's existing American River water service contract for a change in delivery location.

The conceptual I-5 bridge intake would be located approximately 20 miles downstream of Nimbus Dam. The quality of American River water at this location is of slightly lower quality than at Nimbus Dam because of increased local urban runoff (see Attachment A, Table A-4). However, water quality is still high enough at this location that blending of this water with the Mokelumne River supply is not expected to degrade the overall high quality of EBMUD's existing supply. Although health risks could be slightly higher with water from this source than with the current supply or the FSC, the general quality of water from this source is expected to be high enough to minimize potential health risks and health risk uncertainties to customers. This alternative would meet the water quality criterion.

Although this alternative would require substantial coordination with and approvals from the City of Sacramento and County of Sacramento, it is anticipated to be jurisdictionally feasible and it would meet the economic criteria. All other criteria would be met according to available information. This alternative will be evaluated further in the EIR/EIS. This alternative is substantially similar to the "Joint Project with the City of Sacramento and the County of Sacramento - Intake Upstream of the I-5 Bridge," except that

the joint project alternative includes additional actions by the City and County. Because the potential environmental effects of the "Joint Project with the City of Sacramento and the County of Sacramento - Intake Upstream of the I-5 Bridge" would be very similar to, but generally greater than this EBMUD-only alternative, this alternative will only be addressed in the EIR/EIS as a part of that joint project alternative.

Sacramento River Water Treatment Plant Delivery

Water quality at the Sacramento River WTP location is generally less than that of both the American River and EBMUD's existing Mokelumne River supply (see Attachment A, Table A-4). In the Hodge Decision (1990), as part of the technical report prepared under the direction of the Court, the SWRCB (1988b) investigated whether a significant difference exists in water quality and public health concerns for both raw and treated water supplies from the American River, the Sacramento River below the confluence, and the Sacramento/San Joaquin Delta. The report concluded that although it is difficult to accurately determine the public health risks of treated drinking water from the various sources, the lower water quality in the Sacramento River renders it a greater public health risk than American River water. (California State Water Resources Control Board 1988b). This finding was also emphasized in the Hodge Decision (1990, pp. 72, 73).

Based on the overall lower quality of Sacramento River water, inherent treatment uncertainties (including the potential for stricter regulatory thresholds in the future and risks associated with disinfection byproducts [see Attachment A]), and the conclusions drawn in *EDF et al. v. EBMUD* regarding the importance of utilizing water from the highest quality source available, an alternative involving use of Sacramento River water below the American

River/Sacramento River confluence would not meet the water quality criterion.

Because of the substantial estimated cost of the treatment processes described for this alternative, membrane filtration pretreatment followed by reverse osmosis (Table 5-1), it is also anticipated to be incapable of meeting the economic criteria.

The brine disposal required for a reverse osmosis process requires a brine discharge and its associated impacts. The feasibility of this anywhere along the Sacramento River is very uncertain because other water users downstream could be adversely affected. Brine disposal for the Delta is discussed under the Delta delivery alternative.

It is uncertain whether this alternative would be capable of meeting the criteria related to environmental and biological resources, required permits, and timing. Environmental concerns exist related to listed and proposed threatened and endangered species in the Sacramento River. These species could be affected by the intake and by brine disposal.

Failure to meet the water quality and economic criteria, combined with uncertainty concerning brine disposal and its associated environmental impacts, preclude this alternative from further consideration for the Supplemental Water Supply Project.

Sacramento River at Freeport Delivery

The preceding discussion on water quality in the Sacramento River as compared to that of both the American River and EBMUD's existing Mokelumne River supply (Attachment A, Table A-4) is equally applicable to this alternative. The lower water quality in the Sacramento River renders it a greater public health risk than American River water (California State Water Resources Control Board 1988b). This finding was also

emphasized in the Hodge Decision (1990, pp. 72, 73).

Based on the overall lower quality of Sacramento River water, inherent treatment uncertainties (including the potential for stricter regulatory thresholds in the future and risks associated with disinfection byproducts [see Attachment A]), and the conclusions drawn in *EDF et al. v. EBMUD* regarding the importance of utilizing water from the highest quality source available, an alternative involving use of Sacramento River water at the Freeport location would not meet the water quality criterion.

Additionally, substantial new facilities would be required to treat this water to achieve the project objectives. These facilities would be costly and because of the estimated cost of this alternative (see Table 5-1) it is also does not meet the economic criteria.

Similar to the Sacramento River Water Treatment Plant delivery alternative, it is uncertain whether this alternative could meet the criteria on availability of resources, environmental and biological resources, required permits, and timing. The feasibility of brine disposal in the Sacramento River required for this alternative is very uncertain. Brine disposal for the Delta is discussed under the Delta delivery alternative.

Delivery of water at Freeport would also expose sensitive fish species, including delta smelt and winter-run chinook salmon (both protected under the federal Endangered Species Act), to potential effects associated with an intake facility. The Sacramento River at Freeport is within the area designated by USFWS as critical habitat for Delta smelt under the federal Endangered Species Act (59 FR 852, January 6, 1994), and is also within the downstream migration route used by juvenile winter-run chinook salmon (59 FR 440, January 4, 1994). It is unknown whether such impacts would be considered acceptable.

Failure to meet the water quality and economic criteria combined with its environmental and biological uncertainties preclude this alternative from further consideration for the Supplemental Water Supply Project.

Delta Delivery

EBMUD has evaluated proposals and alternatives that include an intake in the Sacramento-San Joaquin Delta. A summary of the findings of various Delta supply alternatives are referenced in Volume I, Exhibit 9-1, p. 9-4 in the Updated WSMP Final EIR (EDAW 1993). EBMUD also has first-hand experience with treating Delta water on an emergency basis. EBMUD blended varying amounts of Delta water with Pardee water at the terminal reservoirs during the 1976-1977 drought. According to the "Water Quality Impacts" testimony of Dale D. Newkirk, given before the SWRCB as part of EBMUD's November 1992 Mokelumne River Hearing (California State Water Resources Control Board 1992), it took approximately 5 years for the trihalomethane (THM) influence of the Delta water to subside to pre-Delta blend levels. Taste and odor problems were also prevalent during and after the Delta water blending.

For EBMUD to introduce Delta water directly into its system on an ongoing basis would require major upgrades or expansion of its water treatment system, including significant economic impacts associated with capital improvement costs for these facilities. Table 5-1 provides the estimated costs to incorporate the Delta as a partial or complete water source.

This alternative would allow EBMUD to use its American River supply, although the water would be delivered at a point far downstream of the American River, necessitating a modification of EBMUD's American River water service contract.

As described in Attachment A (Table A-4) of this report, water quality in the Delta is substantially lower than the quality of EBMUD's existing Mokelumne River supply. By incorporating extensive treatment, including reverse osmosis, into this alternative, the quality of the Delta supply could generally be improved to approximately Mokelumne River quality. However, as discussed above for the evaluation of Sacramento River diversion alternatives, as a result of in depth investigations and extensive testimony, it was concluded in *EDF et al. v. EBMUD* that because of its water quality characteristics the Delta supply would not minimize health risks or health risk uncertainties for EBMUD customers, even with treatment. This conclusion included consideration of the increased potential for treatment uncertainties inherent in the more complex treatment methods required to adequately treat Delta water, as compared with the treatment necessary for water from other available sources. Because use of Delta water could degrade EBMUD's existing supplies and would not minimize health risks and uncertainties to customers, this alternative does not meet the water quality criterion.

Additionally, the reliability of the Delta supply is questionable because of the potential for severely limited flows during dry years in the southern Delta. With its high estimated cost (see Table 5-1), it does not meet the economic criteria.

Implementation of this alternative would involve significant permitting requirements for both a new intake facility and for the disposal of highly saline brine that would be created. The disposal of brine from a desalination facility would require a brine disposal pipeline and discharge located distant from all urban and agricultural intake facilities (see Figure 3-5). The ability to obtain a permit for such brine disposal is also highly uncertain.

This alternative could also result in environmental and biological impacts, including

effects on sensitive fish species, such as Delta smelt and winter-run chinook salmon (both protected under the federal Endangered Species Act), which are already subject to adverse impacts in the Delta region. It is unknown whether this alternative can meet the environmental criterion.

It is unlikely that this alternative could be studied, designed, permitted, and constructed in compliance with the timing criterion.

The inability of this alternative to meet the water quality and economic criteria combined with the significant uncertainty regarding its ability to meet several of the other criteria preclude this alternative from further consideration for the Supplemental Water Supply Project.

Joint Project Alternatives

Joint Project with the City of Sacramento and the County of Sacramento - Intake Upstream of I-5 Bridge

Under this alternative, EBMUD would take delivery of American River water from the area of the confluence of the American and Sacramento rivers. This would require modification of EBMUD's existing American River water service contract for a change in delivery location.

Preliminary negotiations among project participants indicate that this alternative would be jurisdictionally feasible. All other criteria would be met, based on available information.

This alternative will be evaluated further in the EIR/EIS.

As discussed above, this alternative is substantially similar to the EBMUD-only "American River Delivery - Intake Upstream of the I-5 Bridge" alternative, but generally will have greater environmental effects. Therefore,

it could be considered as a surrogate for a similar EBMUD-only alternative.

Joint Project with the City of Sacramento and the County of Sacramento - Fairbairn WTP Intake Only

This alternative would require modification of EBMUD's existing American River water service contract for a change in delivery location to the Fairbairn WTP. This alternative was discussed between EBMUD, the County, and the City and was rejected by these parties during negotiations for a mutually acceptable joint project alternative. Therefore, an agreement for this alternative could not be feasibly negotiated between the parties.

As with the EBMUD-only FSC alternatives, this alternative would also be more limited in its ability to meet EBMUD's water supply reliability needs than some other alternatives because of Hodge flow restrictions, especially during dry periods. This alternative would provide a supplemental water supply not dependent on the availability of the Mokelumne River supply or Pardee Reservoir operations. The ability to increase EBMUD's operational flexibility and enhance supply reliability is sufficient to meet the supply reliability criteria. However, because this alternative would result in increased deliveries from the lower American River at a single location, effects on fish may be more pronounced than with either a FSC delivery alternative or an alternative involving taking delivery of EBMUD's Reclamation water service contract water near the mouth of the river.

Inability to meet the jurisdictional criterion precludes this alternative from further consideration for the Supplemental Water Supply Project.

Table 5-1. Comparison of Alternatives in Meeting Screening Criteria

Criteria Categories														
	Use of Existing Reclamation Contract for American River Water	Water Quality	Water Supply Reliability		Environmental and Biological		Updated WSMP Planning Objectives Consistency	Technical and Operational	Jurisdictional		Timing	Economic		
Criteria Summary:	Allows EBMUD to take its contracted maximum 150,000 AF per year of American River water consistent with the Hodge Decision (objective)	Maintains the high quality of EBMUD's raw and treated water supply while minimizing health risks and health risk uncertainties for customers, consistent with state and federal law and EBMUD's Policy 81? (objective)	Increases system reliability by providing reliable alternate water supply to EBMUD's Mokelumne River supply in case of a catastrophe or scheduled major maintenance at Pardee Reservoir? (objective)	Provides increased operational flexibility and reduce customer deficiencies? (objective)	Increases opportunities for protection and enhancement of Mokelumne River resources? (objective)	Does not result in unacceptable environmental impacts?	Contributes to achieving EBMUD's planning objectives established as part of the Updated WSMP? (objective)	Does not have significant geotechnical or engineering problems, questionable or untested technologies, or unreliability of site or resources?	Does not require permits that cannot be reasonably obtained given cost, logistics, or existing technology?	Does not require infeasible approvals, agreements, or coordination between EBMUD and other agencies or jurisdictions?	Capable of being feasibly implemented by 2001?	Estimated total capital cost to EBMUD (in millions of dollars)?	Of reasonable cost while meeting most of the project objectives?	Minimizes costs to rate payers?
EBMUD-Only Alternatives														
American River Delivery through the Folsom South Canal														
Pipeline Alignment 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown, based on potential infeasibility of CCT rail line abandonment and use of ROW by EBMUD	Yes	326.5	Yes	Yes
Pipeline Alignment 2	Yes, with contract modification for change in FSC turnout location	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	183.5	Yes	Yes
Pipeline Alignment 3	Yes, with contract modification for change in FSC turnout location	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown, based on potential infeasibility of CCT rail line abandonment and use of ROW by EBMUD	Yes	252.5	Yes	Yes
Pipeline Alignment 4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	281.5*	Yes	Yes
Open Canal	Yes, with contract modification for change in FSC turnout location	Unknown	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	151.5	Yes	Yes
American River Delivery - Intake Upstream of I-5 Bridge	Yes, with contract modification for change in diversion location	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	300	Yes	Yes
Sacramento River Water Treatment Plant Delivery	Yes, with contract modification for change in diversion location	No	Yes	Yes	Yes	Yes	Yes	Unknown	Unknown	Unknown	Unknown	Greater than 1,260	No	No
Sacramento River at Freeport Delivery	Yes, with contract modification for change in diversion location	No	Yes	Yes	Yes	Unknown	Yes	Unknown	Unknown	Unknown	Yes	1,260	No	No
Delta Delivery	Yes, with contract modification for change in diversion location	No	Unknown	Unknown	Yes	Unknown	Yes	Unknown	Unknown	Unknown	Unknown	1,080	No	No

Table 5-1. Comparison of Alternatives in Meeting Screening Criteria

Criteria Categories		Criteria									
Criteria Categories	Criteria	Use of Existing Reclamation Contract for American River		Water Quality		Water Supply Reliability		Environmental and Biological		Updated WSP Planning Objectives Consistency	
		Allows EBMUD to take its contracted maximum 150,000 AF per year of American River water consistent with the Hodge Decision (objective)	Maintains the high quality of EBMUD's raw and treated water supply while minimizing health risks and health risk uncertainties for customers, consistent with state and federal law and EBMUD's Policy 817 (objective)	Increases system reliability by providing reliable alternate water supply to EBMUD's Mokelumne River supply in case of a catastrophe or scheduled major maintenance at Pardee Reservoir? (objective)	Provides increased operational flexibility and reduces customer deficiencies? (objective)	Increases opportunities for protection and enhancement of Mokelumne River resources? (objective)	Does not result in unacceptable environmental impacts? (objective)	Contributes to achieving EBMUD's planning objectives established as part of the Updated WSP? (objective)	Does not have significant geotechnical or engineering problems, questionable or untested technologies, or inability of site or resources? (objective)	Does not require permits that cannot be reasonably obtained given cost, logistics, or existing EBMUD and other agreements, or coordination between agencies or jurisdictions?	Capable of being feasibly implemented by 2001?
Criteria Categories	Criteria	Economic		Timing		Jurisdictional		Technical and Operational		Political	
		Estimated total capital cost to EBMUD (in millions of dollars)?	Of reasonable cost while meeting most of the project objectives? Minimizes costs to rate payers?	Estimated total capital cost to EBMUD (in millions of dollars)?	Capable of being feasibly implemented by 2001?	Estimated total capital cost to EBMUD (in millions of dollars)?	Of reasonable cost while meeting most of the project objectives? Minimizes costs to rate payers?	Estimated total capital cost to EBMUD (in millions of dollars)?	Of reasonable cost while meeting most of the project objectives? Minimizes costs to rate payers?	Estimated total capital cost to EBMUD (in millions of dollars)?	Of reasonable cost while meeting most of the project objectives? Minimizes costs to rate payers?
Joint Project Alternatives	City of Sacramento and County of Inake	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Upstream of I-5 Bridge	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	City of Sacramento and County of Fairbairn WTP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Inake Only	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	City of Sacramento and County of Sacramento - River Water Treatment Plant Delivery	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Capital cost does not consider increased operations and maintenance costs that would be associated with a canal versus a pipeline.	EBMUD/CALFED Combined Delivery	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	City of Sacramento and County of Sacramento - River Water Treatment Plant Delivery	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	City of Sacramento and County of Sacramento - River Water Treatment Plant Delivery	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	City of Sacramento and County of Sacramento - River Water Treatment Plant Delivery	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	City of Sacramento and County of Sacramento - River Water Treatment Plant Delivery	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Capital cost does not consider increased operations and maintenance costs that would be associated with a canal versus a pipeline.
Source: CH2M Hill 1997.

Joint Project with the City of Sacramento and the County of Sacramento - Sacramento River Water Treatment Plant Delivery

This alternative would also require modification of EBMUD's existing American River water service contract for a change in delivery location to the City of Sacramento's Sacramento River Water Treatment Plant.

As noted for previous alternatives, water quality in the Sacramento River is of lower quality than EBMUD's current supply and would require additional treatment. The public health risks and uncertainties associated with Sacramento River water as compared to other EBMUD sources, which were discussed earlier for other alternatives, applies to this alternative as well. This alternative would not meet the water quality criterion.

The costs for this alternative are likely to approach the costs estimated for the EBMUD-only Sacramento River Treatment Plant Delivery alternative, although some savings might be realized through cost sharing. Because of the anticipated cost of this alternative it is also does not meet the economic criteria. It is unknown whether this joint project agreement could feasibly be negotiated between EBMUD and the City and County of Sacramento. All other criteria could be met, based on available information.

The inability of this alternative to meet the water quality and economic criterion, combined with its institutional uncertainty, preclude it from further consideration for the Supplemental Water Supply Project.

EBMUD/CALFED Combined Facility

The current CALFED alternatives do not include an American River diversion, but one conveyance alternative under consideration does entail an isolated facility for Sacramento River water diverted at Hood, south of Freeport, connecting to the State and Federal Pumping

Plants at (Banks and Tracy). Another potential alternative could include modified or expanded facilities in the southern Delta near Tracy and Banks.

As noted for previous alternatives, water quality in the Sacramento River and Delta is of lower quality than EBMUD's current supply and would require additional treatment. Public health risks and uncertainties associated with Sacramento River water, even with treatment, were confirmed in *EDF et al. v. EBMUD* (see preceding evaluations of Sacramento River alternatives). Use of Sacramento River water under the CALFED alternative could degrade the quality of EBMUD's existing supply and would not minimize health risks and health risk uncertainties. Therefore, this alternative would not meet the water quality criterion.

Because this alternative has not been developed beyond a very conceptual stage, no information is available to indicate whether it would meet the remaining criteria. Because the CALFED project is currently in early stages of a statewide planning and review process, it is unlikely that the alternative could meet the timing criterion. Environmental and biological effects could be similar to those for other Sacramento River alternatives or could show enhanced fish and wildlife benefits based on the broader Program and the ecosystem restoration component.

Although a cost estimate is not available for this alternative, if diversion and conveyance costs were shared with CALFED it could potentially result in lower costs to EBMUD rate payers for those components, compared to an EBMUD-only alternative. Other water users, however, have different treatment systems and conveyance facilities (i.e., open canals), and any assumptions about shared treatment costs are speculative. Because the high treatment and brine disposal costs may not be shared the potential financial benefit of shared facilities is limited.

Inability to meet the water quality criterion and the timing criterion preclude this alternative from further consideration for the Supplemental Water Supply Project.

POTENTIAL COMBINATIONS OF ALTERNATIVES

Each potential project alternative was formulated as a standalone means to provide the entire supplemental water supply; implementation of a combination of alternatives would not be economically efficient at this time and in some cases could result in unnecessary impacts. Additionally, no two alternatives implemented in combination would meet the project objectives substantially better than the alternatives individually. For these reasons, no combination of alternatives was identified for further evaluation in this report. However, some of the alternatives that were screened out in this report may be implemented individually or as additions in the future for other agencies or different objectives. Any such projects will require additional, project-level environmental documentation.

SUMMARY OF SUPPLEMENTAL WATER SUPPLY PROJECT EIR/EIS ALTERNATIVES

Table 5-2 summarizes the results of the alternatives evaluation. As noted in Table 5-2, two EBMUD-only project alternatives and one joint project alternative were found to substantially meet the screening criteria. These three alternatives will be further evaluated in the Supplemental Water Supply Project EIR/EIS.

As discussed previously, the EBMUD-only "American River Delivery - Intake Upstream of the I-5 Bridge" alternative is very similar to the "Joint Project with the City of Sacramento and the County of Sacramento - Intake Upstream of the I-5 Bridge" alternative. Therefore, for purposes of the EIR/EIS, the more inclusive joint project will be analyzed in detail. It is

anticipated that the environmental analysis of the joint project alternative will sufficiently address the potential environmental effects of a similar downsized EBMUD-only alternative.

Alternative 1: No Action

Consistent with the State CEQA Guidelines, the EIR/EIS will include evaluation of a no-action alternative. Under this alternative, the Supplemental Water Supply Project would not be implemented, and EBMUD would continue to operate Pardee Reservoir and the Mokelumne Aqueducts under their current operational guidelines. EBMUD's anticipated need for water would not be adequately met and would increase due to increased use of the Mokelumne River by others and EBMUD would have no backup supply for use during scheduled or unplanned facility outages at Pardee Reservoir.

Alternative 2: Folsom South Canal Connection Project

This alternative is the same as the "American River Delivery through the Folsom South Canal" described in Chapter 3 of this report. All four potential pipeline alignments identified in Chapter 3 will be evaluated for this alternative. Improvements to EBMUD's existing service area water treatment system will be considered part of this project.

Alternative 3: Joint Water Supply Project

As this alternatives screening report was developed, significant progress was made in further defining and examining the feasibility of the joint project chosen for evaluation in the EIR/EIS. This alternative is the same as the "Joint Project with the City of Sacramento and the County of Sacramento - Intake Upstream of the I-5 Bridge" described in Chapter 3. This alternative would involve construction of a new intake structure on the American River just upstream of the I-5 bridge. Assuming that the

City and County will share portions of the capital and annual costs, this alternative is the least costly of the joint project alternatives evaluated in this report and would likely provide increased water supply and reliability benefits. A conceptual description of this alternative is

provided in Chapter 3, and a more detailed description will be provided in the EIR/EIS. Improvements to EBMUD's existing service area water treatment system will be considered part of this project.

Table 5-2. Summary of Results of Alternatives Screening Process		
Alternative	Fails to Substantially Meet Screening Criteria	Substantially Meets Screening Criteria
EBMUD-Only Project Alternatives		
American River Delivery through the Folsom South Canal		
Pipeline Alignments 1-4		✓
Open Canal	✓	
American River Delivery - Intake Upstream of I-5 Bridge		✓
Sacramento River Water Treatment Plant Delivery	✓	
Sacramento River at Freeport Delivery	✓	
Delta Delivery	✓	
Joint Project Alternatives		
Joint Project with the City of Sacramento and the County of Sacramento - Intake Upstream of I-5 Bridge		✓
Joint Project with the City of Sacramento and the County of Sacramento - Fairbairn WTP Intake Only	✓	
Joint Project with the City of Sacramento and the County of Sacramento - Sacramento River Water Treatment Plant Delivery	✓	
EBMUD/CALFED Combined Facility	✓	

Chapter 6. Citations

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